Installation Guide

hp StorageWorks File System Extender

Product Version: 3.1

First Edition (January 2005)

Part Number: AA–RW18A–TE

This guide describes how to install the HP StorageWorks File System Extender software. It details software and environment requirements and includes mandatory pre-installation and preparation procedures.

File System Extender Installation Guide
First Edition (January 2005)

contents

about this guide

This installation guide provides information to help you:

- Prepare the environment prior to installing the software.
- Install the software.
- Verify successful installation and troubleshoot problems.

“About this Guide” topics include:

Overview

Intended Audience

This book is intended for use by system administrators who are experienced with the following (depending on the type of installation):

- SUSE LINUX Enterprise Server 8 (SLES) or Red Hat Enterprise Linux 3 (RHEL) operating systems (abbreviated to Linux throughout this guide)

  You must have a thorough knowledge of Linux and to be logged on to the system as root in order to execute shell commands.

- Windows 2003, Windows 2003 Storage Server or Windows 2000 operating systems (abbreviated to Windows throughout this guide)

  You must have administrator's rights in order to perform the preparation of the operating system environment.

Once the software is successfully installed, you then need to configure File System Extender (FSE) resources, such as disk media and tape libraries, FSE file systems, and configure migration policies. This configuration is described in the *FSE User Guide*.

Prerequisites

Before you set up the FSE system, make sure you consider the items below.

- Software requirements:

  Check additional software requirements needed for setting up the FSE system. Verify that the correct package versions are installed before you begin with the FSE installation (see "Required Packages for SUSE LINUX Enterprise Server 8 (SLES 8)" on page 27, "Required Packages for Red Hat Enterprise Linux 3 (RHEL 3)" on page 29, or "Required Packages for a Windows Operating System" on page 32).

- Hardware requirements:

  For information on hardware requirements see the *FSE Release Notes*.

Related Documents

In addition to this guide, HP provides corresponding information:

- *FSE Release Notes* (`RelNo.pdf` on the installation CD)

  This document provides information on product requirements, new features, limitations, and recommendations.

- *FSE User Guide* (`UserG.pdf` on the installation CD)

  This guide is intended for FSE users. It describes basic concepts of the FSE installation as well as typical tasks needed for operating FSE.

- *FSE Management Console Reference Guide* (`UIG.pdf` on the installation CD)

  This guide describes how to use the add-on FSE Management Console application, and easy-to-use tool that enables you to perform many FSE monitoring and administration tasks.

Additionally, FSE commands with detailed description of their functionality and syntax are explained in the FSE command-line reference, which is installed as part of the FSE package and available on Linux as UNIX man pages, and on Windows as Windows help. This information is also provided in the *FSE User Guide*.

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our web site: http://www.hp.com.

HP Technical Support

Technical support information can be found at the HP Electronic Support Center:

- http://www.hp.com/support

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Description of the steps being performed

HP Storage Web Site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: http://www.hp.com/country/us/eng/prodserv/storage.html. From this web site, select the appropriate product or solution.

HP Authorized Resellers

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP web site for locations and telephone numbers: http://www.hp.com.

Introduction and Preparation Basics

1

HP File System Extender (FSE) is a mass storage oriented software product, based on client-server technology. It provides large storage space by combining disk storage and a tape library with high-capacity tape media and by implementing Hierarchical Storage Management (HSM).

Refer to the *FSE User Guide* for a detailed product description.

This *Installation Guide* tells you how to prepare the environment and install the FSE software. You then need to configure FSE resources, such as disk media and tape libraries, HSM file systems, and partitions. You also need to configure migration policies. This described in the *FSE User Guide*.

An installation script is provided to help you speed-up the installation of FSE software on Linux systems (see "FSE Installation Script (Linux)" on page 95).

FSE Deployment Options

An FSE installation supports external Linux and Windows clients and can be set up as a:

- **Consolidated Implementation**, where FSE server and client are both in a single machine. See page 12.
- **Mixed Implementation**, a consolidated implementation with additional external FSE clients. See page 13.
- **Distributed Implementation**, an FSE server system and one or more separate FSE clients. See page 14.

FSE systems support both Linux and Windows servers and Linux and Windows clients, so a system can be customized for either heterogeneous or homogenous operating system environments.

Note: Before installing FSE software, consider your current environment so that you can match the installation to your needs.

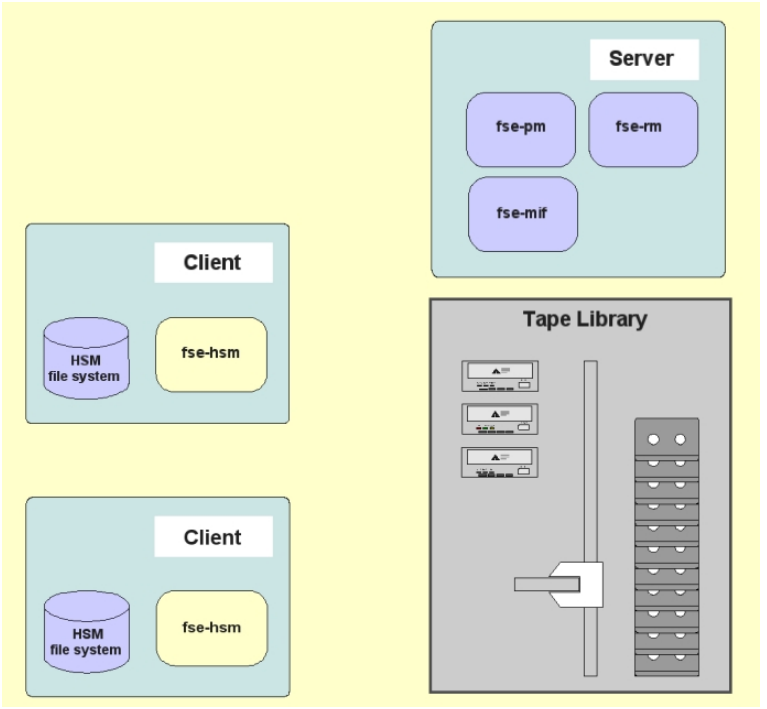
For a description of the specific components shown in Figure 1 and Figure 2, refer to the *FSE User Guide*. Key to components:

fse-hsm	FSE Hierarchical Storage Manager
fse-mif	FSE Management Interface
fse-pm	FSE Partition Manager
fse-rm	FSE Resource Manager

Consolidated Implementation

Consolidated implementations integrate FSE server and client functionality in a single machine. It connects directly to the disk media or SCSI tape library with FSE drives and slots; it also hosts an arbitrary number of HSM file systems used as storage space by FSE users. The machine runs all the processes of a working FSE environment. User data from local HSM file systems is recorded on disk media or tape media in the attached tape library.

Figure 1: Consolidated Implementation



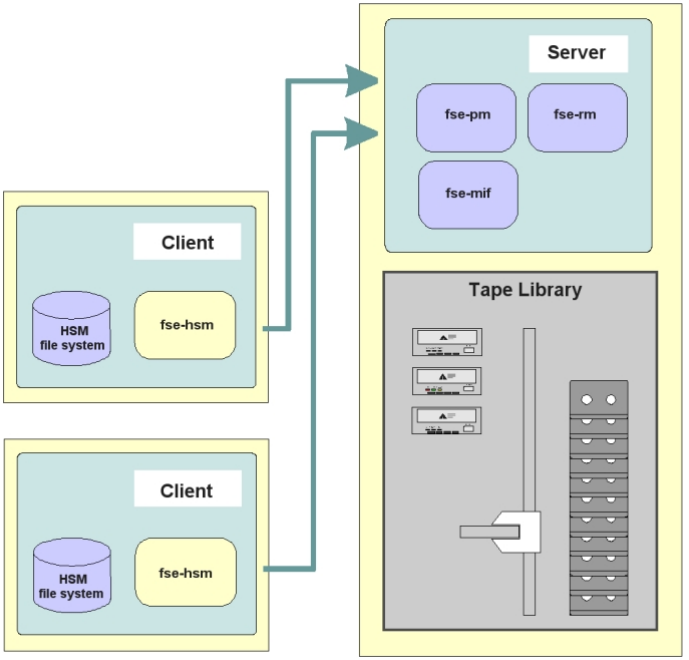
Note: Consolidated implementations are sometimes called *standalone* installations.

Mixed Implementation

Mixed implementations consist of an integrated FSE server and FSE client with additional clients connected to it. External FSE clients (Linux and/or Windows) are physically separated from the integrated server/client.

External FSE clients connect to the FSE installation through LAN, and host additional HSM file systems. They run only processes that provide functionality for managing these HSM file systems and communicate with major services running on the consolidated implementation. User data from HSM file systems on clients is transferred to the consolidated FSE installation and recorded on disk media or tape media in the attached tape library.

Figure 2: Mixed Implementation



Note: Mixed implementations are sometimes called *standalone with external clients* installations.

Note: Communication among components of a distributed FSE installation is based on CORBA technology (omniORB). A reliable bidirectional network connection from each of the external FSE clients to the consolidated FSE installation is an essential prerequisite for reliable operation of a distributed FSE installation. Communication between FSE installation components through a firewall is neither supported nor tested.

Distributed Implementation

A distributed implementation consists of a central FSE server with disk media or SCSI tape library attached and one or more external FSE clients (Linux and/or Windows) that are connected to the server.

An FSE server is similar to the consolidated implementation with all major services running on it, but it does not host any HSM file system; all HSM file systems in such an environment reside on FSE clients—the machines that only run the essential processes for local HSM file system management and utilize major services on the FSE server. User data from these remote file systems is transferred to the FSE server and recorded on the corresponding disk media or tape media in the attached tape library.

Note: See the note about omniORB for Mixed Implementations above.

Distributed implementations are sometimes called *distributed system with separate server and external clients* installations.

Preparing File Systems for FSE

In order to optimize the FSE installation operation and increase its reliability, you should organize file systems on the host that will be dedicated to the FSE server, as well as on the FSE client. If you intend to use disk media, you also need to prepare file systems to hold disk media files.

The following sections explain the importance of preparing file systems for FSE operation and provide formulas to estimate the required space for FSE components. These explanations and formulas apply generally when configuring

an FSE system. The preparation itself, however, is operating-system specific and described in "Preparing File Systems on Linux Systems" on page 35 and "Preparing File Systems on Windows Systems" on page 42.

The following table summarizes the main parameters to be considered when setting up the environment. These parameters are discussed later in this chapter.

Table 1: Pre-Installation Considerations

Parameter	Description	Reference
FSE file system size	Determine the minimum FSE file system size using such data as expected number of files and average file size.	Formula for the Expected HSM File System Size, page 17.
Fast Recovery Information (FRI) size	Determine the expected size of FRI.	Formula for the Expected Size of Fast Recovery Information, page 18.
File System Catalog (FSC) size	FSC contains location history and metadata. Determine expected size of FSC.	Formula for Expected File System Catalog Size, page 18.
HSM database size	Determine expected HSM database size	Formula for Expected Hierarchical Storage Manager Database (HSMDB) Size, page 19.
Disk buffer files	File system storing disk buffer should be at least 10% of joint FSE files systems.	Space Requirements of FSE Disk Buffer Files, page 21.
Debug files	Debug files are optional but may grow and fill up the file system. Use symbolic link.	Storage Space for FSE Debug Files, page 21.

Reasons for Organizing File Systems

There are several reasons why you need to re-organize file systems on the machine that will host the FSE software:

- Increase reliability of the core FSE databases

  FSE databases are vital FSE components and need to be secured to allow the FSE installation to become as stable as possible. Splitting the file system, which contains FSE databases, into several file systems provides increased security.

- Reserve sufficient disk space for FSE databases, FSE log files, and FSE debug files

  FSE databases, FSE log, and FSE debug files can grow quite large in time. Gradually, some file systems that hold these files can become full, which may lead to partial or complete data loss. For more information on calculation of the required disk space, see "Estimating the Size of File Systems" on page 17.

- To allow the creating of HSM file-system backups

Linux systems: HSM file systems that contain user files must be placed on Logical Volume Manager (LVM) volumes. This allows HSM file system snapshots to be created for backup purposes. You should also consider creating file systems for disk media on LVM volumes.

Organizing the File System Layout

During the FSE installation process, several new directories are created and FSE related files are copied to them. This is an FSE directory layout. Some of the directories in this layout are necessary for correct FSE installation operation. For improved robustness and safety purposes, they must be placed on a separate file system. This prevents problems on one directory influencing data on any of the others.

Directories and their characteristics are listed in Table 2 and Table 3 according to location. On Windows, *%InstallPath%* is used as a location descriptor. By default, this is *%ProgramFiles%*\Hewlett-Packard\FSE but could be changed during installation if **Custom** setup was chosen.

Table 2: FSE Server Directory Layout

Linux	Windows	Contents	Linux/Windows FS Type
/var/opt/fse/	*%InstallPath%*\var	Configuration Database, Resource Management Database, Fast Recovery Information files	Ext3/NTFS
/var/opt/fse/part/	*%InstallPath%*\var\part	File System Catalog	Ext3/NTFS
/var/opt/fse/diskbuf/	*%InstallPath%*\var\diskbuf	FSE disk buffer files	any/NTFS
/var/opt/fse/log/	*%InstallPath%*\var\log	FSE log files, FSE debug files	any/NTFS
/var/opt/fse/dm/	*%InstallPath%*\var\dm	FSE disk media	any/NTFS

Table 3: FSE Client Directory Layout

Linux	Windows	Contents	Linux/Windows FS Type
`/var/opt/fse/part/`	*`%InstallPath%`*`\var\part`	Hierarchical Storage Manager Database	EXT3/NTFS
`/var/opt/fse/log/`	*`%InstallPath%`*`\var\log`	FSE log files, FSE debug files	any/NTFS

Estimating the Size of File Systems

Each of the previously mentioned file systems holds large databases. Therefore, you need to calculate the space requirement for all of them before they are created.

The sizes of the HSM file system, Fast Recovery Information (FRI) files, File System Catalog (FSC), and Hierarchical Storage Manager Database (HSMDB) files are all related to several parameters. Among these parameters are the number of files on an HSM file system and their average size.

Linux systems: By default, 32 MB of journal space is created for the Ext3 file system. This should be sufficient for the file systems of directories:

- `/var/opt/fse/`
- `/var/opt/fse/part/`
- `/var/opt/fse/diskbuf/`

Formula for the Expected HSM File System Size

Use this simplified formula to calculate the minimum HSM file system size:

$$\textbf{\textit{minHSMFSsize}} = \frac{125 \times [(afs \times nf \times pon) + (bks \times 2 \times nf)]}{100}$$

where:

minHSMFSsize	The minimum required HSM file-system size in bytes
afs	The average file size in bytes
nf	The expected number of files on an HSM file system
pon	The percentage of online files (%)
bks	The file-system block size in bytes

Formula for the Expected Size of Fast Recovery Information

Fast Recovery Information (FRI) consists of a set of files, each corresponding to a single open data volume on a configured FSE medium, which grows in size as the percentage of used space on the volume increases. FRI files reach maximum size when the corresponding data volume becomes full. The FRI files are then copied to appropriate locations on the FSE medium and removed from disk.

Us this formula to calculate the expected maximum size of FRI files on disk:

$$\textbf{\textit{maxFRIsize}} = \frac{nv \times sv \times [(lf + 350) \times nm / tbks]}{[sf \times nm / tbks]}$$

where:

maxFRIsize	The estimated maximum size of FRI files on disk in bytes
nv	The total number of open FSE medium volumes[1] in the FSE system
sv	The size of an FSE medium volume on tape in bytes.
lf	The average file name length of files being migrated in bytes.
nm	The average number of files migrated together in the same migration job.
tbks	The block size on an FSE medium[2] in bytes.
sf	The average size of files being migrated in bytes.
[...]	Square brackets indicate that the value inside is rounded up to an integer.

[1] normally, the number of configured FSE media pools containing media with migrated files
[2] assuming all FSE media pools are configured with the same block size (block size is uniform on all FSE media.)

Formula for Expected File System Catalog Size

The File System Catalog (FSC) is a database that consists of the Data Location Catalog (DLC) and the Name Space Catalog (NSC). The DLC records the full history of file locations on FSE media. The NSC contains metadata of files on an HSM file system.

Factors used for FSC size estimation:

- Approximate usage 180 bytes per file for FSC (DLC + NSC) for typical file generation with two copies and file name size of 16 characters using standard file attributes (Linux). You need to add the size of additional attributes on Windows—access control lists (ACL), extended attributes (EAs) and alternate data streams (ADS).

- Additional 36 bytes for media volume index for each file copy is required when you run FSC consistency check. This will be used on first run of consistency check.

Note: It is recommended that you add another 50% as a reserve when calculating maximum FSC size.

The following examples present space usage for typical configurations.

Example 1: three copies, one generation:

(189 for FSC) + (36 x 3 for volume index) = 297 bytes

Each new generation takes 47 + (36 x 3) = 155 bytes

Size = ((297 + add attr size) x max number of files) + (155 x number of old generations)

Example 2: two copies, one generation:

(180 for FSC) + (36 x 2 for volume index) = 252 bytes

Each new generation takes 38 + (36 x 2) = 110 bytes

Size = ((252 + add attr size) x max number of files) + (110 x number of old generations)

Example 3: one copy, one generation:

(162 for FSC) + (36 for volume index) = 198

Each new generation takes 20 + 36 = 56 bytes

Size = ((198 + add attr size) x max number of files) + (56 x number of old generations)

Formula for Expected Hierarchical Storage Manager Database (HSMDB) Size

This is the formula for calculating the maximum Hierarchical Storage Management Database (HSMDB) size:

$$\textbf{\textit{maxHSMsize}} = (nf \times 12) + [nf \times pdi \times (afnl + 30)] + [nf \times pon \times (afnl + 40)]$$

where:

maxHSMsize	The maximum HSM database size in bytes.
nf	The expected number of files on an HSM file system.
pdi	The percentage of directories (%).
afnl	The average length of file names in bytes.
pon	The percentage of online files (%).

Sample Calculation for Expected Sizes of HSM File System, FSC and HSMDB

The following is an example of a calculation of space required on an HSM file system and on the file system holding File System Catalog (FSC), HSM Database (HSMDB), and Fast Recovery Information (FRI) files.

Sample input for calculation:

- HSM file system for 10 million entities (files and directories)
- average size of files being migrated is 100 KB
- 20% of files are online

  (*online* means they occupy space on the local HSM file system)
- 20% of all entities on the HSM file system are directories
- average file name length of files being migrated is 10 characters
- files have only one generation
- average number of copies per file generation amounts to two

Sample result:

- minimum HSM file system size: 216-306 GB, depending on block size (1 KB, 2 KB, 4 KB)
- maximum File System Catalog size: 453 MB
- maximum HSM Database size: 287 MB

The File System Catalog and the HSMDB together require 2.4 GB. That is approximately 1% of the size of minimum required HSM file system size for this input.

Sample Calculation for Expected Total Size of the FRI Files

The following is an example of a calculation of space required on the file system holding the Fast Recovery Information (FRI) files.

Sample input for calculation:

- total number of open FSE medium volumes in the FSE system is 8
- size of an FSE medium volume on tape is 5135 MB
- average size of files being migrated is 100 KB
- average file name length of files being migrated is 10 characters
- average number of files migrated together in the same migration job is 50
- block size on tape medium is 128 KB

Sample result:

- estimated maximum size of FRI files on disk: 1027 MB

Space Requirements of FSE Disk Buffer Files

In general, the size of the file system that will store FSE disk buffer should be approximately 10% of the joint size of the HSM file systems. However, if there are large files stored on HSM file systems, the FSE disk buffer file system should be at least twice the estimated size of the largest file.

If you plan to perform medium duplication, make sure that the available space for the FSE disk buffer is at least the sum of the size of all media volumes of the largest medium multiplied by factor 2 (for example 200 GB disk buffer space for duplicating a 100 GB medium).

Storage Space for FSE Debug Files

Linux systems: The `/var/opt/fse/log/debug` directory holds optional FSE debug files. These files, if generated, contain a large amount of data and can grow very fast. In order to prevent them filling up the `/var/opt/fse` file system, you need to make the directory `/var/opt/fse/log/debug` a symbolic link to one of the following directories outside the file system for `/var/opt/fse`:

- `/var/log/FSEDEBUG`
- `/tmp/FSEDEBUG`

  (If `/tmp` is a separate file system and not part of the root file system)

Creating symbolic links is done after you create and mount the required file systems.

Note: If there is enough disk space that is not yet partitioned, you can also make a new partition for the debugs, create an Ext3 file system on it, and mount it on `/var/opt/fse/log/debug`.
You need to add a line to the `/etc/fstab` file, for example,
`/dev/mynewdebugpart /var/opt/fse/log/debug  ext3 defaults 1 2`

Windows systems: If you are concerned with excessive growth of FSE debug files, you may want to consider allocating a dedicated disk partition/volume to a file system, which can then be mounted to *`%InstallPath%`*`\var\log\debug`.

Installation Overview

2

This chapter provides an installation overview for Linux-based installations and Windows-based installations. Each overview summarizes the steps necessary to prepare the system and to install the FSE software. Where appropriate, you are pointed to more detailed steps within this document.

Linux Operating System

Action	Comments & where to find details
1. Install all necessary packages	Required Packages for SUSE LINUX Enterprise Server 8 (SLES 8), page 27. Required Packages for Red Hat Enterprise Linux 3 (RHEL 3), page 29.
2. Prepare logical volumes:	Preparing Logical Volume Manager (LVM) Volumes, page 35.
a. Prepare partitions	Step 1: Define and initialize LVM physical volumes, page 36.
b. Create logical volume groups	Step 2: Create and initialize LVM logical volume groups, page 36.
c. Create logical volumes	Step 3: Create and initialize LVM logical volumes, page 37, Step 4: Create LVM volumes for HSM file systems, page 38.
d. Create file system on each logical volume (command: `mke2fs`)	Creating File Systems On Top of LVM Volumes, page 39).
e. Create mount-point directories	Mounting File Systems for FSE Databases and System Files, page 40).
f. Mount FSE databases and system files on previously created directories	Mounting File Systems for FSE Databases and System Files, page 40).
g. Update the `/etc/fstab` file with required information	This is to mount the files systems (FSE databases and system files) automatically at boot time.
3. Install the FSE software	Installing an FSE Release on Linux, page 47.
4. Start FSE	Starting the FSE Installation, page 80.
5. Mount HSM file systems: a. Create directories b. Update the `/etc/fstab` file with required information	Automating the Mounting of HSM File Systems, page 65. To mount HSM file systems, add entries for these file systems to the local file-system table-file `/etc/fstab`. **Note:** This step if similar to steps 2e & 2f where you mounted the FSE databases and system files. In this step, you are mounting HSM file systems.
6. Configure resources (for example, libraries, media pools, and media)	*FSE User Guide, Chapter 2.*

Windows Operating System

Action	Comments and where to find details
1. Install all necessary packages	Required Packages for a Windows Operating System, page 32.
2. Prepare partition a. Control Panel > Administrative Tools > Computer Management > Disk Management > right-click > Create Partition/Create Logical Drive b. Follow Create Partition Wizard	Preparing File Systems on Windows Systems, page 42.
3. Install the FSE software a. Run `setup.exe` b. Follow InstallShield Wizard c. Modify the PATH variable to include: `C:\%InstallPath%\bin`	Installing an FSE Release on Windows, page 69.
4. Start FSE	Starting the FSE Installation, page 80.
5. Check the status of the Firebird SuperServer and FSE processes.	Checking the Status of a Running FSE Installation, page 81.
6. If necessary, mount the disk volumes: ■ Use `mountvol` command to define a mount point ■ Use `fse --mount` command to configure a mount point	Automating the Mounting of HSM File Systems, page 65.
7. Configure resources (for example, libraries, media pools, and media)	*FSE User Guide, Chapter 2.*

Preparing the Operating System Environment

3

This chapter describes the necessary changes that need to be made to the operating system environment on the computer that will host a consolidated FSE installation (integrated server and client) or a distributed FSE installation (separate server and separate client). It also lists the required third-party packages that must be installed prior to installing the FSE software.

Preparing Linux Operating Systems

SUSE LINUX Enterprise Server

SUSE LINUX Enterprise Server 8 Service Pack 3 (SLES8, SP 3, *kernel:* 2.4.21-138-default, 2.4.21-138-smp or 2.4.21-138-smp4G) must be installed on all FSE system components running on SLES 8.

Red Hat Enterprise Linux

You need to upgrade all Red Hat Enterprise Linux 3 systems (RHEL 3, *kernel:* 2.4.21-20.EL, 2.3.21-20.ELhugemem or 2.4.21-20.ELsmp) that will become FSE system components to RHEL 3 ES Update 3 in order to enable installation of the FSE software.

Required Packages for SUSE LINUX Enterprise Server 8 (SLES 8)

Table 4 lists the required package versions for a SUSE LINUX Enterprise Server 8 (SLES 8) system and the components of FSE that require each package. Unless stated otherwise, later versions are also acceptable.

Table 4: Packages and their relation to FSE components on SUSE LINUX Enterprise server

Package Package file name (SLES)	FSE client	FSE server	Consolidated Implementation
Extended Attributes utilities `attr-2.4.2-55.i586.rpm`	✓		✓
Logical Volume Manager package `lvm-1.0.5-51.i586.rpm`	✓	✓	✓
E2fsprogs tools `e2fsprogs-1.28-30.i586.rpm`	✓	✓	✓
libgcc C library `libgcc-3.2.2-38.i586.rpm`	✓	✓	✓
libstdc++ C++ library `libstdc++-3.2.2-38.i586.rpm`	✓	✓	✓
glibc C library `glibc-2.2.5-213.i586.rpm`	✓	✓	✓
glibc locale C library `glibc-locale-2.2.5-213.i586.rpm`	✓	✓	✓
Firebird SuperServer `FirebirdSS-1.0.3.972-0.64IO.i386.rpm` *sourceforge.net/projects/firebird/*		✓	✓
Python interpreter `python-2.2.1-68.i586.rpm` *www.python.org*	✓	✓	✓

Upgraded Samba package with offline file support
`samba-2.2.8a-133HSM.i386.rpm`
`samba-client-2.2.8a-133HSM.i386.rpm`
	✓		✓

tar archiving package `tar-1.13.25-46`	✓	✓	✓

Required Packages for Red Hat Enterprise Linux 3 (RHEL 3)

Table 5 lists the required package versions for a Red Hat Enterprise Linux 3 (RHEL 3) system and the components of FSE that require each package. Unless stated otherwise, later versions are also acceptable.

Table 5: Packages and their relation to FSE components on Red Hat Enterprise Linux

Package Package file name (RHEL)	FSE client	FSE server	Consolidated Implementation

Extended Attributes utilities
`attr-2.2.0-1.i386.rpm`
`libattr-2.2.0-1.i386.rpm`
	✓		✓

Logical Volume Manager package `lvm-1.0.8-5.i386.rpm`	✓	✓	✓
E2fsprogs tools `e2fsprogs-1.32-15.i386.rpm`	✓	✓	✓
libgcc C library `ibgcc-3.2.3-42.i386.rpm`	✓	✓	✓
libstdc++ C++ library `libstdc++-3.2.3-42.i386.rpm`	✓	✓	✓
glibc C library `glibc-2.3.2-95.20.i386.rpm`	✓	✓	✓
Firebird SuperServer `FirebirdSS-1.0.3.972-0.64IO.i386.rpm` *sourceforge.net/projects/firebird/*		✓	✓
Python interpreter `python-2.2.3-5.i386.rpm` *www.python.org*	✓	✓	✓

Upgraded Samba package with offline file support
`samba-3.0.6-2.3E.HSM.i386.rpm`
`samba-client-3.0.6-2.3E.HSM.i386.rpm`
	✓		✓

tar archiving package `tar-1.13.25-13`	✓	✓	✓

Verifying Third-Party Packages on Linux

To check whether the required package versions are installed, use `rpm -q` followed by the package name without the version and suffix:

```
# rpm -q <PackageName>
```

If the package has been installed, the command responds with:

```
<PackageName>-<PackageVersion>
```

Otherwise, the response is:

```
package <PackageName> is not installed
```

Example: To check if `libgcc-3.2-45.i586.rpm` has been installed, enter `rpm -q libgcc` in the command line. Note that later versions are also acceptable.

Installing Firebird SuperServer on a Linux FSE Server

Consolidated FSE installations and FSE servers require the third-party software, Firebird SuperServer, used in managing the resource database.

To uncompress the RPM package (`FirebirdSS-1.0.3.972-0.64IO.i386.rpm`) and install the files to the appropriate locations, use the RPM installation tool:

1. Unpack and install the FirebirdSS package using the command line:

   ```
   # rpm --install FirebirdSS-1.0.3.972-0.64IO.i386.rpm
   ```

2. In the `/etc` directory, create a plain text file `Hewlett-Packard_hosts.equiv` containing the following two lines:

   ```
   +
   +localhost
   ```

3. Once the Firebird SuperServer is installed, open the file `/etc/rc.config` with any plain text editor, search for the `START_FIREBIRD` variable, and set its value to `"yes"`. If the line does not exist, add it as follows:

   ```
   # Start the Firebird RDBMS ?
   #
   START_FIREBIRD="yes"
   ```

   If `/etc/rc.config` does not exist, create it and add the above contents.

Disabling ACPI

Some Linux kernels can have incomplete implementation of support for the Advanced Configuration and Power Interface (ACPI). Enabled kernel support for ACPI causes problems on the symmetric multiprocessing (SMP) machines (the

machines with multiple processors), and on machines with SCSI disk controllers. This means that you need to disable the kernel support for ACPI before booting the SMP version of a Linux kernel on a SMP machine or an arbitrary Linux kernel version on a machine with SCSI disk controller. ACPI has to be disabled on all supported SUSE LINUX distributions. The following additional boot-loader parameter disables ACPI:

```
acpi=off
```

However, with some configurations, this single parameter does not give the desired effect. In such cases, a different set of boot-loader parameters must be specified to disable ACPI. Instead of the `acpi=off` string, you must provide the following options:

```
acpi=oldboot pci=noacpi apm=power-off
```

See http://portal.suse.com/sdb/en/2002/10/81_acpi.html for information on kernel parameters to control the ACPI code.

Disabling ACPI with GRUB boot loader

To disable ACPI, you need to edit the GRUB configuration file `/boot/grub/menu.lst` and add the syntax `acpi=off` to it.

The following is an example for supplying the required booting parameter to a kernel image that resides in the directory `/boot/bzImage` on the system's first hard drive:

```
title Linux
    root   (hd0,0)
    kernel /boot/bzImage acpi=off
```

Disabling ACPI with LILO boot loader

To disable ACPI, you need to edit the LILO configuration file and add the syntax `append = "acpi=off"` to it. The LILO configuration file is usually `/etc/lilo.conf`.

This is an example for supplying the required booting parameter to a kernel image that resides in the directory `/boot/bzImage`:

```
image = /boot/bzImage
        label = Linux
        read-only
        append = "acpi=off"
```

After you add this option to the LILO configuration file, run `lilo` to ensure that at the next boot, ACPI will be disabled.

Preparing a Windows Operating System

Note: You need administrative privileges to prepare the operating system environment. These privileges are granted only if you are locally logged to the system as `Administrator`. Remote Desktop cannot be used for this task.

No specific tasks are required on the supported Windows operating system.

Required Packages for a Windows Operating System

Table 6 lists required package versions for all supported Windows systems and an additional package required on the Windows 2000 Server operating system. It shows the components of FSE that require each package. Unless stated otherwise, later versions are also acceptable.

Table 6: Required packages for all supported Windows operating systems

Package	FSE client	FSE server / Consolidated Implementation
Python 2.3.x (latest version recommended) *www.python.org*	✓	✓
Python Win32All 2.3.201 `pywin32-201.win32-py2.3.exe` *sourceforge.net/projects/pywin32/*	✓	✓
Firebird SuperServer `Firebird-1.0.3.972-Win32.exe` *sourceforge.net/projects/firebird/*		✓

Table 7: Additional package for the Windows 2000 Server operating system

Package	FSE client	FSE server / Consolidated Implementation
StorageCraft VolumeSnapshot 1.1.57 *(license needed)*	✓	✓

Verifying Third-Party Packages on Windows

On Windows, the FSE installation wizard automatically checks for required packages, and notifies you if any are missing.

Note: If any components are missing, you can still install FSE, but you need to install the missing packages before using FSE. Without the required packages, FSE will not operate properly.

To check manually whether required packages are installed, use the Windows Control Panel. Click **Start** > **Settings** > **Control Panel**, and then double-click **Add/Remove Programs** to list currently installed programs.

Installing Firebird SuperServer on a Windows FSE Server

Consolidated FSE installations and FSE servers require the third-party software, Firebird SuperServer, used in managing the resource database.

The software is located on the FSE installation CD-ROM in the `Win32\3Party\Firebird` directory.

The Firebird SuperServer installation wizard guides you through the installation process.

When the Firebird SuperServer is installed, use Firebird Control Panel to start Firebird Service, activate Guardian and configure Firebird to run as a service and start automatically. You can access Firebird Control Panel by selecting the **Start** > **Programs** > **Firebird Control Panel** menu item on the Windows desktop.

Disabling Tape Drives

FSE system uses a SCSI generic interface to access, control, and transfer the data to and from FSE libraries and FSE drives. In order for this interface to work correctly on Windows, you must disable the operating system device drivers for all tape drives that will be configured as FSE drives. You only need to perform this step on the consolidated FSE system or the FSE server.

To disable tape drives, proceed as follows:

1. Run the Device Manager.
2. In the Device Manager window, expand the **Tape drives** group.
3. For each drive that will become an FSE drive (including tape drives of the type **Unknown**), disable the drive by right-clicking its name and clicking **Disable**.

Disabling Medium Changers *(Windows Server 2003 and Windows 2000 only)*

You need to disable the operating system's device drivers for SCSI medium changers (SCSI library robotic controls) to enable operation of FSE libraries in the FSE system. You only need to perform this step on a consolidated FSE implementation or an FSE server.

To disable medium changers:

1. Run Device Manager.
2. In the Device Manager window, expand the **Medium Changers** group.
3. For each library that will become an FSE library, disable the corresponding medium changer by right-clicking its name and clicking **Disable**.

If the Removable Storage service is running on th system, this will seriously degrade the performance of migrations. Stop the service and disable its automatic startup as follows:

1. Run Services by selecting **Start > Settings > Control Panel > Administrative Tools > Services**.
2. In the Name column, search for the Removable Storage entry, right-click and select **Properties**.
3. In the Startup type drop-down list, select **Disabled**.
4. Stop the service by clicking **Stop**.

Note: On a Windows Storage Server, uninstall the Veritas Storage Manager component or installation will fail.

Preparing File Systems for FSE

4

In order to optimize the FSE installation and increase its reliability, it may be necessary to re-organize the file systems on the host that will be dedicated to the FSE server as well as on the FSE client. When using disk media, you need to prepare file systems to hold disk media files.

This chapter is split according to the operating system:

- "Preparing File Systems on Linux Systems" on page 35
- "Preparing File Systems on Windows Systems" on page 42.

Preparing File Systems on Linux Systems

The following sections describe the steps you need to perform on the supported Linux operating systems to manually define the necessary Logical Volume Manager (LVM) volumes, create file systems on top of them, and mount the file systems created for FSE databases and system files.

Alternatively, you can perform the above steps automatically by running the FSE installation script. This script includes customizable parameters, and can also be used for other FSE installation-related tasks. This installation script is described in "FSE Installation Script (Linux)" on page 95.

Preparing Logical Volume Manager (LVM) Volumes

All file systems that FSE uses, including the file systems holding FSE databases, should be located on Logical Volume Manager (LVM) volumes. This way you can create file system snapshots to perform a file system backup (as part of the FSE backup task).

For detailed instructions on LVM usage, refer to LVM manuals, LVM man pages, and web site http://tldp.org/HOWTO/LVM-HOWTO.

Caution: Use the LVM command set with caution, as certain commands can destroy existing file systems!

To create the file systems on LVM volumes that are needed by FSE, proceed as follows:

Step 1: Define and initialize LVM physical volumes

LVM physical volumes can be either whole disks or disk partitions. It is recommended to use disk partitions and not whole disks as they can be mistakenly considered as free disks.

Caution: Any data on these disks or partitions will be lost as you initialize a LVM volume. Make sure you specify the correct device or partition.

Note: Commands for managing LVM physical volumes begin with letters `pv` (physical volume) and are placed in the `/sbin` directory.

In the example below, the first partition of the first SCSI disk and the first partition on the second SCSI disk are initialized as LVM physical volumes and are dedicated to the LVM volumes. Use values according to your actual disk configuration:

```
# pvcreate /dev/sda1
# pvcreate /dev/sdb1
```

Step 2: Create and initialize LVM logical volume groups

LVM logical volume groups are a layer on top of the LVM physical volumes. One LVM logical volume group can occupy one or more LVM physical volumes.

Note: Commands for managing LVM logical volume groups begin with letters `vg` (volume group) and are placed in the `/sbin` directory.

In the following example, the newly created LVM physical volume `/dev/sda1` is assigned to the LVM volume group `vg_fsesda`, and the LVM physical volume `/dev/sdb1` is assigned to the LVM volume group `vg_fsesdb`.

Volume group `vg_fsesda` will store FSE databases and system files, and volume group `vg_fsesdb` will store HSM file systems with user files and directories.

Use names and values according to your preferences and actual LVM physical volume configuration:

```
# vgcreate vg_fsesda /dev/sda1
# vgcreate vg_fsesdb /dev/sdb1
```

Caution: It is recommended to separate FSE databases and system files from user data on HSM file systems by putting them on two separate LVM volume groups, as shown in the previous example. This helps to increase data safety.

Note: If you intend to create LVM logical volumes larger than 256 GB, you must use `-s (--physicalextentsize)` option with `vgcreate`, and specify a physical extent larger than 4 MB.

For example: a physical extent of 4 MB enables LVM to address up to 256 GB and a physical extent of 32 MB allows addressing 2 TB of disk space. Note that the recommended physical extent size for the FSE file system and disk media (if under LVM) volume groups is 32 MB.

For details on using the `vgcreate` command, see vgcreate man page (`man vgcreate`).

Step 3: Create and initialize LVM logical volumes

LVM logical volumes are virtual partitions and can be mounted like ordinary partitions once file systems are created on them.

Note: Commands for managing LVM logical volumes begin with letters `lv` (logical volume) and are placed in the `/sbin` directory.

In the following example, LVM logical volumes are created on the LVM volume group `vg_fse` for the three important directories that FSE uses, namely:

- `/var/opt/fse/`
- `/var/opt/fse/part/`
- `/var/opt/fse/diskbuf/`

You should use logical volume names according to your preferences and sizes that correspond to your actual LVM volume group configuration:

```
# lvcreate -L 6G -n fsevar vg_fse
# lvcreate -L 6G -n fsepart vg_fse
# lvcreate -L 20G -n fsediskbuf vg_fse
```

Note: You need to leave some free space for optional LVM snapshot volumes on the LVM volume group, which are created during backup of the FSE installation. Size of the reserved space should be approximately 15-20% of the whole LVM volume group size, as recommended by the LVM developers.

The exact value depends on actual load of the LVM volumes: it should be increased if frequent changes to the HSM file systems are expected during the FSE backup or if the FSE backup process is expected to last longer.

The `/var/opt/fse/log` directory is not as critical as others, and can be located on an ordinary file system outside the other three. For more details on configuration, see "Storage Space for FSE Debug Files" on page 21.

Step 4: Create LVM volumes for HSM file systems

To create the LVM logical volume for a single HSM file system that will actually contain user files, use the `lvcreate` command. Use a logical volume name according to your preferences, and a size that corresponds to your actual LVM volume group configuration:

```
# lvcreate -L 400G -n hsmfs_01 vg_hsmfs
```

Repeat the procedure to create the LVM logical volumes for each additional HSM file system you are going to use.

Creating File Systems On Top of LVM Volumes

After the LVM logical volumes have been successfully initialized, you need to create file systems on top of them using the command `mke2fs`.

It is recommended that you use the `mke2fs` options `-j` for journal file creation and `-b 4096` for specifying block size of 4096 bytes.

Tip: If you want to check the properties your file system will have without actually creating it, you can run the command `mke2fs` with the switch `-n`.

An example output of checking the `example_fs` file system values is as follows:

```
# mke2fs -n -b 4096 -j /dev/vg_fse/example_fs
 mke2fs 1.28 (14-Mar-2002)
 Filesystem label=
 OS type: Linux
 Block size=4096 (log=2)
 Fragment size=4096 (log=2)
 456064 inodes, 911680 blocks
 45584 blocks (5.00%) reserved for the super user
 First data block=0
 28 block groups
 32768 blocks per group, 32768 fragments per group
 16288 inodes per group
 Superblock backups stored on blocks:
 32768, 98304, 163840, 229376, 294912, 819200, 884736
```

Note: The number of inodes in the `mke2fs` output corresponds to expected maximum number of files on the file system. If this number is not satisfactory, you can explicitly tell `mke2fs` to reserve a certain number of inodes with the `-N` option.

Note that the upper limit for the number of inodes is affected by two factors: the file system size and the file system block size. On a file system with size *Fs* and block size *Bs*, the maximum size of inodes *In* is determined by the equation *Fs = Bs * In*. If you specify a number bigger than *In*, the `mke2fs` command creates *In* inodes.

For example, to create one million inodes you must specify the `-N 1000000` option. In case of a block size of 4096 Bytes, the file system size must be equal to or greater than 3.8 GB (4 096 000 Bytes) for this number of inodes to be actually created:

```
# mke2fs -b 4096 -j -N 1000000 /dev/vg_fse/example_fs
```

Proceed as follows and first create the file systems for the FSE databases and system files, and after that create HSM file systems.

Step 1: Creating file systems for FSE databases and system files

Use the following command sequence to create the file systems for the FSE databases and system files (for our example):

```
# mke2fs -b 4096 -j /dev/vg_fse/fsevar
# mke2fs -b 4096 -j /dev/vg_fse/fsepart
# mke2fs -b 4096 -j /dev/vg_fse/fsediskbuf
```

Each command reports several properties (values) of a newly created file system.

Step 2: Creating HSM file systems

Use the following command to create an HSM file system on top of LVM logical volume `hsmfs_01`. In this example, the HSM file system will store a maximum of 500,000 files (number of inodes)

Use a LVM logical volume name according to your actual LVM volume configuration, and number of inodes according to your HSM file system requirements. Consider the limitation on the number of inodes that can be created on a file system with specific total size and specific block size:

```
# mke2fs -b 4096 -j -N 500000 /dev/vg_hsmfs/hsmfs_01
```

Now create the HSM file systems on all other LVM logical volumes that will be used as FSE partitions. Use values according to your FSE installation.

Note: The number of inodes on the file system cannot be changed after the file system has been put into use!

The next step tells you how to mount file systems for FSE databases and system files.

Mounting File Systems for FSE Databases and System Files

The last step of the preparation procedure is to mount the file systems for FSE databases and FSE system files. Note that the file systems for the FSE partitions, that is HSM file systems, can only be mounted after the FSE daemons have been successfully started.

To mount the necessary file systems, do the following:

1. Create the first, of the three important FSE directories (and its parents):

   ```
   # mkdir -p /var/opt/fse
   ```

2. Manually mount the corresponding file system for the directory `/var/opt/fse`. You must use the device (logical volume) name from your actual LVM configuration:

   ```
   # mount /dev/vg_fse/fsevar /var/opt/fse
   ```

3. Now create the two remaining directories:

```
# mkdir /var/opt/fse/part
# mkdir /var/opt/fse/diskbuf
```

4. Manually mount the corresponding file systems for these two directories. You must use the device (logical volume) names from your actual LVM configuration:

```
# mount -o data=journal /dev/vg_fse/fsepart /var/opt/fse/part
# mount /dev/vg_fse/fsediskbuf /var/opt/fse/diskbuf
```

Note: The option `data=journal` is used when mounting the file system on the directory `/var/opt/fse/part`. This improves file system stability and performance.

5. Use the following command to check that all file systems have been mounted successfully, for example:

```
# cat /etc/mtab
/dev/hda2 / ext3 rw 0 0
proc /proc proc rw 0 0
devpts /dev/pts devpts rw,mode=0620,gid=5 0 0
/dev/hda1 /boot ext3 rw 0 0
/dev/hda5 /usr ext3 rw 0 0
/dev/hda6 /var ext3 rw 0 0
/dev/vg_fse/fsevar /var/opt/fse ext3 rw 0 2
/dev/vg_fse/fsepart /var/opt/fse/part ext3 rw,data=journal 0 2
/dev/vg_fse/fsediskbuf /var/opt/fse/diskbuf ext3 rw 0 2
```

6. To automate this process such that the file systems are mounted at boot time, add the appropriate entries to the file-system table-file `/etc/fstab`. When adding entries to the `/etc/fstab` file, note that the device names in the first column correspond to our example LVM configuration:

```
/dev/vg_fse/fsevar     /var/opt/fse ext3   defaults 1 2
/dev/vg_fse/fsepart    /var/opt/fse/part ext3 data=journal  1 2
/dev/vg_fse/fsediskbuf /var/opt/fse/diskbuf ext3 defaults 1 2
```

Note: The keyword `data=journal` must be specified in the fourth column in `/etc/fstab` for correctly mounting the file system on the `/var/opt/fse/part` directory. This improves file system stability and performance.

Note that all parameter entries must be entered in the proposed order.

Creating a Symbolic Link for Debug Files Directory

There are several possibilities where you may store the FSE debug files, as listed in “Storage Space for FSE Debug Files” on page 21.

Note: When you make the decision about the placement of the FSE debug files, you need to make sure that the disk partition holding the target directory with the debug files has enough free space for eventually a large amount of the debugging data.

For example, to create a symbolic link to the directory `/var/log/FSEDEBUG`, use the following commands:

```
# rmdir /var/opt/fse/log/debug
# mkdir /var/log/FSEDEBUG
# ln -s /var/log/FSEDEBUG /var/opt/fse/log/debug
```

This completes the Linux preparation stage, now go to “Installing FSE Software (Windows)” on page 67 to find out how to install the software.

Preparing File Systems on Windows Systems

On all Windows systems that will host HSM file systems, you need to prepare a separate disk volume (partition) for each HSM file system that you plan to create.

Additionally, to increase data safety of the FSE databases and system files, you should dedicate a separate volume for these files on each Windows system that is part of the FSE system. This way you also avoid some of the potential problems that might be encountered during FSE system backup.

Configuring a Separate Volume for an HSM File System

Before you configure a volume (partition) for the HSM file system, estimate the size you need—see “Estimating the Size of File Systems” on page 17.

To create a separate volume (partition), proceed as follows:

1. In the Windows Control Panel, double-click **Administrative Tools**, and then double-click **Computer Management**.
2. Click **Disk Management**, right-click an unallocated region of a basic disk, and then click **Create Partition**, or right-click free space in an extended partition, and then click **Create Logical Drive**. Note that dynamic disks are also supported.
3. Follow the Create Partition Wizard. For the first three steps, set the appropriate options and click **Next**.

4. In the Assign Drive Letter or Path window, select either **Assign a drive letter** or **Mount this volume at an empty folder that supports drive paths** option and click **Next**.
5. In the next step of the Create Partition Wizard, accept the default options by clicking **Next**.
6. Click **Finish** to close the Create Partition Wizard and format the newly created partition.

Note: Later on, after the FSE software is installed, you have to use the `fse --dismount-ntfs VolumeName` command for each volume that you have configured for an HSM file system. Use the `mountvol` command to determine the volume name. For more information, see Automating the Mounting of HSM File Systems, page 65.

Configuring a Separate Volume for FSE Databases and System Files

To configure a separate volume (partition) for FSE databases and system files, perform the following steps:

1. In the same way that you prepared volumes for HSM file systems (see page 43), create a volume (partition) for the FSE databases and system files.
2. If you are installing a Consolidated Windows Implementation or a Windows FSE server, create the following directories:
   - *%InstallPath%*\var
   - *%InstallPath%*\var\part
   - *%InstallPath%*\var\diskbuf

   If you are installing a Windows FSE client, create the following directories on the client:
   - *%InstallPath%*\var
   - *%InstallPath%*\var\part

   The *%InstallPath%* string in the directory paths should be the same as the installation directory that you use in the FSD installation wizard.
3. Manually mount the volume for FSE databases and system files using the `mountvol` command. For example:

   ```
   C:\>mountvol C:\Program Files\Hewlett-Packard\FSE\var \
   \\?\Volume{80cd9910-fced-11d8-9c48-00010247e7e9}
   ```
4. Install and start the FSE system as described in chapter 6, "Installing FSE Software (Windows)" on page 67.

Installing FSE Software (Linux) 5

This chapter describes steps you must follow to install FSE software for the first time. The installation procedure depends on the type of installation (consolidated, mixed, or distributed). Mixed environments with an FSE server running on Linux and FSE clients running on Windows (or a Windows server and Linux clients), or external FSE clients running on different platforms, require that you perform Linux-specific as well as Windows-specific installation steps.

This chapter includes the following topics:

Overview

Note: You have to be logged on to the system as root in order to execute the shell commands, which you need to run while performing the installation steps.

To install FSE software:

1. Unpack the FSE packages located on the Linux part of the FSE release installation CD-ROM.

2. Start up the FSE system.
3. Verify that the FSE processes are running.

Note: You can automate the installation of FSE release software on a Linux system using the configurable installation script, which is provided on the FSE release installation CD-ROM. For more information, see Appendix B, *Installing FSE on Existing File Systems* on page 107.

FSE Software: Release, Hot Fixes and FSE Patches

FSE software is distributed as an FSE release, patch, or hot fix. FSE patches and hot fixes are meant for fixing problems that emerged after the new FSE version was released. The next sections describe the differences between them and provide recommendations for their usage.

Release

Every new FSE release brings major new functionality. The FSE release installation process uses the native operating system installation method, that is RPM packages for Linux, and MSI packages and other files for Windows.

Hot Fixes

A hot fix is meant to fix a customer-specific problem. A hot fix provides binaries that must be installed on the FSE installation before the solution to the problem can be verified.

FSE customers can install several hot fixes on the same FSE installation; each hot fix solves a different problem. Hot fixes are not cumulative, but may overlap in one or more binaries included in different hot-fix packages. Therefore, hot fixes must be installed in the correct order.

Note: If the same binary is included in multiple hot fixes, then these hot fixes are cumulative for this particular binary only, and not for all included binaries. For example, if the `fse-bea` binary is included in hot fixes `fse30-hot03lin`, `fse30-hot07lin`, and `fse30-hot09lin`, then the problem that was solved by `fse-bea` fix from `03` is also in `07` and `09`, but the `fse-bea` fix introduced in `09` is neither in `03` nor in `07`.

A hot fix consists of one or more updated files that are packed into an archived package: `tar.gz` for Linux. The ReadMe file lists the problems solved by the hot fix and provides installation instructions. Readme filenames are based on the templates: `fse30-hot<Number>lin-readme` for Linux hot fixes. The `<Number>` string in each template is the hot-fix label.

Patches

A patch provides the functionality of several hot fixes. It includes the updated binaries from all the hot fixes that have been released and confirmed by the time the patch was prepared. The patch also contains all other files that are provided by the FSE release software packages; it therefore replaces the entire FSE release fileset and must be installed in the same way as the FSE release packages.

Patches are cumulative. This means that a patch with a particular consecutive number contains all of the functionality of patches that are labelled with smaller consecutive numbers and supersedes all of them.

Note: Hot fixes are only meant to solve problems that emerge between releases of two consecutive patches. If several hot fixes and a single patch containing these hot fixes are are available, you are recommended to install the patch rather than the hot fixes.

Installing an FSE Release and FSE Patches

Installing an FSE Release on Linux

The FSE installation process is built on RPM packaging technology. FSE installation consists of several installation packages that you need to install selectively. You install the packages according to the component of the FSE installation you are installing: a consolidated FSE installation, an FSE server, or an FSE client.

The following table lists the three types of FSE installation and the FSE packages required for each component, as well as the dependencies between the packages. The dependencies define the correct order in which the packages must be installed.

Table 8: Linux Installation Packages

	FSE Installation Package	Depends on Package	FSE Client	FSE Server	Consolidated Implementation
1.	`fse-common-3.1-<build>.i386.rpm`		✓	✓	✓
2.	`fse-server-3.1-<build>.i386.rpm`	common		✓	✓
3.	`fse-agent-3.1-<build>.i386.rpm`	common		✓	✓
4.	`fse-client-3.1-<build>.i386.rpm`	common	✓		✓
5.	`fse-cli-admin-3.1-<build>.i386.rpm`	common, server		✓	✓
6.	`fse-cli-user-3.1-<build>.i386.rpm`	common, client	✓		✓

Installation Procedure

You need to change the current directory to the one with the installation packages, and install the packages one by one using the `rpm` command in the appropriate order shown in the previous section:

```
# rpm -ivh <FSEInstallationPackage>
```

For example, to install a consolidated FSE implementation, proceed as follows:

```
# rpm -ivh fse-common-3.1*
# rpm -ivh fse-server-3.1*
# rpm -ivh fse-agent-3.1*
# rpm -ivh fse-client-3.1*
# rpm -ivh fse-cli-admin-3.1*
# rpm -ivh fse-cli-user-3.1*
```

Monitoring the Installation

While installing each package, the `rpm` command should report package installation progress and give you the output similar to the ones shown in the following examples.

When installing the `fse-common-3.1-<build>.i386.rpm` package, you should get the following output:

```
Preparing...  ################################## [100%]
1:fse-common  ################################## [100%]
Setting FSE backup configuration file:       [  OK  ]
Setting FSE services configuration file:     [  OK  ]
Setting FSE trace configuration file:        [  OK  ]
Setting FSE startup services:                [  OK  ]

NOTE: after successful installation write the correct
      name of FSE Server system into the file
      /etc/opt/fse/services.cfg and start FSE services
      with command fse --start
```

When installing the `fse-server-3.1-<build>.i386.rpm` package, you should get the following output:

```
Preparing...  ################################## [100%]
1:fse-server  ################################## [100%]
Setting FSE services configuration file:     [  OK  ]
Setting FSE System configuration file:       [  OK  ]
Checking for Firebird:                       [  OK  ]
Setting Resource Manager database file:      [  OK  ]
Upgrading Resource Manager database file:    [  OK  ]

NOTE: after successful installation start FSE services
      with fse --start
```

When installing the `fse-agent-3.1-<build>.i386.rpm` package, you should get the following output:

```
Preparing... ################################## [100%]
1:fse-agent  ################################## [100%]
```

When installing the `fse-agent-3.1-<build>.i386.rpm` package, you should get the following output:

```
Preparing...  ################################## [100%]
1:fse-client  ################################## [100%]
Setting HSM File System Filter module:       [  OK  ]

NOTE: after successful installation write the correct
      name of FSE Server system into the file
      /etc/opt/fse/services.cfg and start FSE services
      with command fse --start
```

When installing the `fse-cli-admin-3.1-<build>.i386.rpm` and `fse-cli-user-3.1-<build>.i386.rpm` packages, you should get an output similar to the one shown for the `fse-agent-3.1-<build>.i386.rpm` package; the only difference is in the package name.

Installing FSE Patches

FSE patches are installed in the same way as FSE release software. You should always install the latest available patch. Consider the following, before and after installing a particular patch:

- An FSE patch may not be installed if another patch that is labelled with a bigger consecutive number has already been installed, except to fall back to the previous version if the patch produces new problems.
- An FSE hot fix may not be installed if a patch that includes this hot fix has already been installed.

Verifying and Repairing the Installed FSE Software

If the FSE release, hot fixes, and patches have been installed correctly, the following procedures help identify the applied hot fixes and patches.

Determining the Build Number

The build number of the installed set of FSE files is unique. The build numbers of different patches are different. The build number of each FSE patch also differs from the initial FSE release build number. Therefore, the build number can be used to determine whether or not a patch has been installed, and if so, which one.

Note: Build numbers are the same for Linux and Windows systems.

Determine the FSE build number using the following command (in this example, `stormus` is the name of the actual FSE installation host):

```
stormus:/opt/fse # rpm -qa | grep fse
fse-server-3.1-185
fse-cli-user-3.1-185
fse-agent-3.1-185
fse-client-3.1-185
fse-common-3.1-185
fse-cli-admin-3.1-185
```

Version numbers of all installed FSE packages must be the same.

Checking the Patches Against the Build Number

After the build number has been determined, check the issued patches against the build number. The ReadMe file of every patch contains the build number that it uses.

```
FSE_3.1_LNX     3.1-185
FSE_3.1_LNX_001 3.1-186
FSE_3.1_LNX_002 3.1-189
FSE_3.1_LNX_003 3.1-190
FSE_3.1_WIN     3.1.185
```

This example shows that on the Linux component of the FSE system, the patch `FSE_3.1_LNX_003` is installed, while the Windows component of the system does not have any patches installed. (`FSE_3.1_WIN` is the base release version number).

Repairing the Installation

If the FSE release software gets corrupted, you need to repair the FSE installation by reinstalling the current FSE release or FSE patch packages. You can also use the repair procedure to uninstall all installed FSE hot fixes.

Use the `rpm -v` command to check whether the installation is corrupt. Note that applied hot fixes change single binaries and other files making it difficult to determine whether or not the installation is corrupt. After repairing the installation, hot fixes need to be reinstalled.

1. Change the current directory to one with the FSE RPM packages and reinstall the FSE packages:

   ```
   # cd <PathToFSEPackageDirectory>
   # rpm -F --force fse*.rpm
   ```

2. Verify the reinstalled packages using the following command:

   ```
   # rpm -V `rpm -qa | grep fse`
   ```

If all FSE release or FSE patch files were correctly updated, the command output is empty.

FSE Hot Fixes

This section tells you how to install, determine, and uninstall hot fixes.

Installing Hot Fixes

To install a hot fix, follow the installation instructions given in the respective ReadMe file. An extract is shown in the following:

Sample Hot Fix Readme file for Linux:

```
-------------------------------------
FSE for Linux, version 3.1, HOT FIX nn
-------------------------------------
Files included and their md5 check-sums:
(md5sum not published)        ./opt/fse/doc/fse31-hot01lin-readme
8a73c748f6fa18c5e2aab6f59fc1821e  ./opt/fse/lbin/fse-mif

Hot fix resolves the following problem(s):
  #1558: "fsefile -H shows wrong filesizes for newer
generations."
         corrected header for fsefile --history
Hotfix is based on version: 3.n.nnn "PATCH_3.n_n"
Installation instructions:
1. Login as root to FSE linux computer and
copy the hot fix to the current directory....
2. Stop FSE processes......
     ~/hot # fse stop
5. Make a backup copy of the file ......
...........
...........
8. Start the FSE processes.
     ~/hot # fse start
```

Note: If you skip step 5 from the hot fix installation instructions (backing up the files that will be updated), the only option for uninstalling the hot fix will be to repair the FSE release or patch installation. Note that this repair procedure uninstalls all other installed hot fixes.

Determining the Installed Hot Fixes

Files that were installed by release or patch installation are tracked in the RPM database. When installing a hot fix, these original files are replaced. To find out what has been changed, you need the hot fix ReadMe files. They are located in the `/opt/fse/doc` directory.

1. Check which hot fix has been installed by running the command:

```
# rpm -V `rpm -qa|grep fse`
S.5....T   /opt/fse/lbin/fse-mif
S.5....T   /opt/fse/man/man8/fsefile.8
SM5....T   /opt/fse/lbin/fse-backup.py
SM5....T   /opt/fse/sbin/fse
SM5....T   /opt/fse/sbin/fsejob
```

This command lists all original non-configuration files that have been replaced, probably by one or more hot fixes. (Note that such a list could also indicate a corrupt installation, as described in “Repairing the Installation” on page 51). If no such changed files are found, the output is empty.

2. Determine the md5 check-sums of these changed files by invoking the following command:

```
# md5sum `rpm -V \`rpm -qa|grep fse\` | awk '{print $2}'`
```

The command should generate an output similar to the following:

```
8a73c748f6fa18c5e2aab6f59fc1821e  /opt/fse/lbin/fse-mif
b8298a3866813b841603aac06b9762db  /opt/fse/man/man8/fsefile.8
7f2aa78996ff7991cdc9436d93b1c63c  /opt/fse/lbin/fse-backup.py
366c215071a3fe6b932b279b4f26f3c7  /opt/fse/sbin/fse
36aac83144fe2225bdc33698d27722d5  /opt/fse/sbin/fsejob
```

3. Compare these md5 check-sums with the check-sums in the ReadMe file. This is the example from the hot fix ReadMe file that lists the md5 check-sums of changed files:

```
Files included and their md5 check-sums:
(md5sum not published)       ./opt/fse/doc/fse31-hot01lin-readme
8a73c748f6fa18c5e2aab6f59fc1821e          ./opt/fse/lbin/fse-mif
```

The comparison of the md5 check-sums shows that the `fse-mif` file originates from `fse31-hot01lin`.

Uninstalling Hot Fixes

An FSE hot fix can be uninstalled in two ways:

- Overwriting the hot-fix files with the backup copies of the initially-installed files.

  A prerequisite for this type of uninstall operation is to backup copies of the initially installed files. These backup copies must have been created before the hot fix was installed.

- By repairing the installation of the FSE release or the FSE patch software. See the description in “Repairing the Installation” on page 51.

Note: By repairing the installation, all installed hot fixes, not just a single hot fix, are uninstalled.

To uninstall a hot fix using the backup copies of the initially installed files, proceed as follows:

1. Stop the FSE processes on all external FSE clients and then FSE processes on the FSE server (or on the consolidated FSE installation) using the `fse --stop` command.
2. Copy original FSE release or FSE patch files from their backup location back to their original location.
3. Delete the backup copies of the original files and the backup directory itself.
4. Delete the hot fix ReadMe file from the `opt/fse/doc` directory.
5. Start the FSE processes on the FSE server (or on the consolidated installation) first and then the FSE processes on external FSE clients using the `fse --start` command.

Preparing the Environment for the First Start-Up of the FSE Installation

Preparing the environment consists of modifying an environment variable and configuring the FSE interprocess communication.

Modifying the MANPATH Environment Variable

To read FSE-specific man pages, extend the search path for man pages as follows:

```
# export MANPATH=$MANPATH:/opt/fse/doc
```

You can permanently extend the search path by adding the above line to your `.bashrc` shell startup file.

In order to use the FSE commands and tools, change the search path as follows:

```
# export PATH=$PATH:/opt/fse/bin:/opt/fse/sbin
```

Preparing the Backup Configuration File with LVM Volume Names

Update the backup configuration file `/etc/opt/fse/backup.cfg` with the LVM volume names that you created in "Preparing Logical Volume Manager (LVM) Volumes" on page 35. It should contain the actual volume group names that contain volumes for `/var/opt/fse` and `/var/opt/fse/part`.

Configuring the FSE Interprocess Communication

During the FSE installation procedure, the FSE software packages are installed on the hosts that will form the FSE installation. On each host, whether it is a consolidated FSE installation, an FSE server, or an FSE client, two communication configuration files are installed. These plain text files store the configurable FSE interprocess communication settings. In certain FSE set-ups, you must manually modify one or both files to enable correct communication between FSE processes. Your actual FSE system deployment and the type of network that is used for FSE interprocess communication determines which specific modifications are required.

Note: An appropriate configuration of the FSE interprocess communication is of crucial importance for normal FSE operation. Incorrectly configured interprocess communication may lead to a non-operating FSE system.

These configuration files are located as follows:

Configuration File	Location
`services.cfg`	`/etc/opt/fse`
`omniORB.cfg`	`/etc/opt/fse`

You can change the default path where FSE system searches for the `omniORB.cfg` file using the `OMNIORB_CONFIG` environment variable.

Note: In the following configuration procedures for LAN connection, if the system you are configuring has several network adapters enabled, you **must** configure the `omniORB.cfg` file as described in the private network communication configuration procedures, instead of renaming it.

In this case, the parameters you specify in `omniORB.cfg` must be verified against the actual LAN configuration for that system.

Configuring communication on a consolidated FSE installation or an FSE server

Note: You can use the `fse_net` command to test connection between client and server. Details are given in Chapter 7 "Troubleshooting" of the *FSE User Guide*.

No External FSE Clients or Ordinary LAN Connection

If your FSE set-up includes only a consolidated FSE installation and you do not plan to connect external clients to it, or if your external FSE clients are connected to the consolidated FSE installation or the FSE server through ordinary LAN, you do not need to modify the default configuration of the `services.cfg` file. Instead, perform the following:

- Rename `omniORB.cfg` on the consolidated FSE system or the FSE server (for example to `omniORB.bak`), so that you will be able to retrieve it later, if needed.

Private Network Connection

If your external FSE clients use a private network for communication with the consolidated FSE installation or the FSE server, you must make the following modifications to the consolidated FSE system or to the FSE server:

- Add the `hostname` variable to `services.cfg` and provide as its value the fully-qualified domain name (FQDN) that identifies the system inside the private network.

  The following is an example of a correctly configured `services.cfg` file in an FSE installation using a private network. The `server` variable is redundant in this situation:

  ```
  hostname = fseserver.fsenet
  server = private-server.fsecompany.com
  ```

- Modify the following parameters in the `omniORB.cfg` file: the FQDN that identifies the system inside the private network, IP address of the system, and the subnet mask. All these parameters must be verified against the actual private network configuration. Make sure that the FQDN you specify in `omniORB.cfg` matches the FQDN specified for the *`hostname`* variable in the `services.cfg` file.

The following is an example of a correctly configured `omniORB.cfg` file:

```
# Which interface omniORB uses for IORs

endPoint = giop:tcp:fseserver.fsenet:

# The order of network interfaces to use for accepting
connections:
# Only localhost and private network. Others are denied.

clientTransportRule = localhost tcp
clientTransportRule = 192.168.240.0/255.255.255.0 tcp
clientTransportRule = * none

# The order of network interfaces to use for opening new
connections:
# Only localhost and private network. Others are denied.

serverTransportRule = localhosttcp
serverTransportRule = 192.168.240.0/255.255.255.0 tcp
serverTransportRule = * none
```

Note: *SUSE LINUX (SLES 8) systems only:* Do not run YaST2 after you have configured this FSE host to use a private network for the FSE interprocess communication. Running YaST2 modifies `/etc/hosts` in such a way that subsequent FSE system start-ups fail.

Alternatively, you can modify `/etc/sysconfig/suseconfig` by changing the line `CHECK_ETC_HOSTS="yes"` to `CHECK_ETC_HOSTS="no"`. You can then run YaST2 without affecting the FSE system operation, but you cannot modify host names with it.

Configuring communication on external Linux FSE clients

Ordinary LAN Connection

If the external Linux FSE clients and the consolidated FSE installation or the FSE server communicate through the ordinary LAN, you only need to modify the `services.cfg` file on each external Linux FSE client and remove the `omniORB.cfg` file. Do the following:

1. Modify the value of the *`server`* variable in `services.cfg` to include the fully-qualified domain name (FQDN) of the consolidated FSE installation or the FSE server the client is connected to. For example:

   ```
   server = hsmhp-server.fsecompany.com
   ```

2. Rename `omniORB.cfg` on external Linux FSE client (for example, to `omniORB.bak`), so that you will be able to retrieve it later, if needed.

Private Network Connection

If the external Linux FSE clients and the consolidated FSE installation or the FSE server communicate through a private network, you must modify both configuration files, `services.cfg` and `omniORB.cfg`, on each external Linux client. The following procedure includes the necessary modification steps:

1. Modify the value of the `server` variable in `services.cfg` to contain the fully-qualified domain name (FQDN) that identifies the consolidated FSE installation or the FSE server inside the private network.
2. Add the `hostname` variable to `services.cfg` and provide as its value the FQDN that identifies the Linux FSE client system inside the private network.

   ```
   hostname = fse-lnx-client.fsenet
   server = fseserver.fsenet
   ```

3. Modify the following parameters in the `omniORB.cfg` file: the FQDN that identifies the consolidated FSE installation or the FSE server inside the private network, IP address of such system, and the subnet mask. All these parameters must be verified against the actual private network configuration. Make sure that the FQDN you specify in `omniORB.cfg` matches the FQDN specified for the *`server`* variable in the `services.cfg` file.

   The following is an example of a properly configured `omniORB.cfg` file:

   ```
   # Which interface omniORB uses for IORs

   endPoint = giop:tcp:fseserver.fsenet:

   # The order of network interfaces to use for accepting
   connections:
   # Only localhost and private network. Others are denied.

   clientTransportRule = localhost tcp
   clientTransportRule = 192.168.240.0/255.255.255.0 tcp
   clientTransportRule = * none

   # The order of network interfaces to use for opening new
   connections:
   # Only localhost and private network. Others are denied.

   serverTransportRule = localhosttcp
   serverTransportRule = 192.168.240.0/255.255.255.0 tcp
   serverTransportRule = * none
   ```

Note: *SUSE LINUX (SLES 8) systems only:* Do not run YaST2 after you have configured this FSE host to use a private network for the FSE interprocess communication. Running YaST2 modifies `/etc/hosts` in such a way that subsequent FSE system start-ups fail.

Alternatively, you can modify `/etc/sysconfig/suseconfig` by changing the line `CHECK_ETC_HOSTS="yes"` to `CHECK_ETC_HOSTS="no"`. You can then run YaST2 without affecting the FSE system operation, but you cannot modify host names with it.

Configuring communication on external Windows FSE clients

Ordinary LAN Connection

If the external Windows FSE clients and the consolidated FSE system or the FSE server communicate through the ordinary LAN, you do not need to modify the default configuration of the `services.cfg` file on external Windows FSE clients. However, you must perform the following step:

- Rename the `omniORB.cfg` file on each external Windows FSE client (for example to `omniORB.bak`), so that you will be able to retrieve it later, if needed.

Private Network Connection

If the external Windows FSE clients and the consolidated FSE system or the FSE server communicate through a private network, you need to modify both configuration files, `services.cfg` and `omniORB.cfg`, on each external Windows client. The following procedure includes the necessary modification steps:

1. Add the *`hostname`* variable to `services.cfg` and provide as its value the FQDN that identifies this Windows-Linux FSE client system inside the private network.

   The following is an example of a correctly configured `services.cfg` using a private network:

   ```
   hostname = fse-win-client.fsenet
   server = fseserver.fsenet
   ```

   Note that the *`server`* variable was already correctly configured by the FSE installation wizard.

2. Modify the following parameters in the `omniORB.cfg` file: the FQDN that identifies the consolidated FSE installation or the FSE server inside the private network, IP address of such system, and the subnet mask. All these

parameters must be verified against the actual private network configuration. Ensure that the FQDN you specify in `omniORB.cfg` matches the FQDN specified for the *`server`* variable in the `services.cfg` file.

The following is an example of a correctly configured `omniORB.cfg` file:

```
# Which interface omniORB uses for IORs

endPoint = giop:tcp:fseserver.fsenet:

# The order of network interfaces to use for accepting
connections:
# Only localhost and private network. Others are denied.

clientTransportRule = localhost tcp
clientTransportRule = 192.168.240.0/255.255.255.0 tcp
clientTransportRule = * none

# The order of network interfaces to use for opening new
connections:
# Only localhost and private network. Others are denied.

serverTransportRule = localhosttcp
serverTransportRule = 192.168.240.0/255.255.255.0 tcp
serverTransportRule = * none
```

Starting the FSE Installation

After installing the required FSE packages, you need to start FSE daemons manually for the first time. Note that the installation process modifies the Linux system start-up scripts so that the FSE processes are started automatically after each restart of the system.

The startup procedure depends on the particular FSE installation configuration:

- "Starting FSE Processes on a Consolidated FSE Installation" on page 61
- "Starting FSE Processes in a Distributed FSE Installation" on page 61
- "Starting the FSE Installation" on page 60.

Starting FSE Processes on a Consolidated FSE Installation

On a consolidated FSE installation that integrates an FSE server and an FSE client, proceed as follows:

1. Start the CORBA Naming Service daemon and FSE processes by entering:

   ```
   # /opt/fse/sbin/fse --start
   ```

   The bottom part of the output should match the following:

   ```
   Starting omniORB Naming Service:            [  OK  ]
   Starting FSE Service:                       [  OK  ]
   Starting FSE Resource Manager:              [  OK  ]
   Starting FSE Management Interface:          [  OK  ]
   Loading HSM FS Filter module:               [  OK  ]
   Starting FSE FS Event Manager:              [  OK  ]
   Mounting HSM File Systems:                  [  OK  ]
   ```

If additional external FSE clients are connected to the consolidated FSE installation, use the procedure described in the next section “Starting FSE Processes in a Distributed FSE Installation” on page 61 to start each client.

Starting FSE Processes in a Distributed FSE Installation

The general rule for starting the FSE system in a distributed installation is to start the FSE processes and services on the FSE server or the consolidated FSE installation first, and, when these processes are running, start the FSE processes on each external FSE client.

Step 1: Starting the FSE Server

To start the FSE server or the consolidated FSE system, do the following at local level:

1. Start the CORBA Naming Service daemon and the FSE processes running by entering the command:

   ```
   # /opt/fse/sbin/fse --start
   ```

   The bottom part of the output should be similar to the following:

   FSE server

   ```
   Starting omniORB Naming Service:            [  OK  ]
   Starting FSE Service:                       [  OK  ]
   Starting FSE Resource Manager:              [  OK  ]
   Starting FSE Management Interface:          [  OK  ]
   ```

Consolidated FSE installation

```
Starting omniORB Naming Service:            [  OK  ]
Starting FSE Service:                       [  OK  ]
Starting FSE Resource Manager:              [  OK  ]
Starting FSE Management Interface:          [  OK  ]
Loading HSM FS Filter module:               [  OK  ]
Starting FSE FS Event Manager:              [  OK  ]
Mounting HSM File Systems:                  [  OK  ]
```

Step 2: Starting FSE Clients

To start each of the external FSE clients connected to the already started FSE server or consolidated FSE installation, do the following at local level:

1. Run the command:

   ```
   # /opt/fse/sbin/fse --start
   ```

   The bottom part of the output should be similar to the following:

   ```
   Starting FSE Service:                    [  OK  ]
   Loading HSM FS Filter module:            [  OK  ]
   Starting FSE FS Event Manager:           [  OK  ]
   Mounting HSM File Systems:               [  OK  ]
   ```

Restarting the FSE Installation

In a distributed FSE installation, start the FSE server first. The FSE processes on each connected FSE client need to be restarted as soon as FSE processes on the server are running again. This sequence is mandatory regardless of the type of the operating system running on a particular FSE host.

Checking the Status of a Running FSE Installation

After you have started FSE processes on all machines that are part of the FSE installation, you can verify that the Firebird SuperServer and the omniNames daemon are running on the consolidated installation or the FSE server, and that the FSE processes are running on all FSE hosts.

FSE systems require the Firebird SuperServer (*FirebirdSS*) to be running on the consolidated FSE system or the FSE server in order to manage the Resource Management Database (RMDB). Firebird SuperServer is started automatically at the end of the Firebird's RPM package installation.

omniNames is the CORBA Naming Service daemon that allows FSE processes to communicate between each other. It must be running on the FSE server's host, that is, on the consolidated FSE installation or on the FSE server system.

Checking Firebird SuperServer on a Linux Server

You can check if the *FirebirdSS* process is running with the command below. This example also displays its output with *FirebirdSS* running:

```
# /etc/init.d/firebird status
Checking for Firebird:                    running
```

If the reported line is:

```
Checking for Firebird:                    unused
```

you need to start Firebird manually using the following command. This command also displays its output when *FirebirdSS* is successfully started:

```
# /etc/init.d/firebird start
Starting Firebird                         [ OK ]
```

If this does not fix the problem, consult Firebird SuperServer documentation for alternative troubleshooting steps.

Checking the omniNames Daemon on a Linux Server

You can check the status of the omniNames daemon with the `omninames --status` command:

```
# /opt/fse/bin/omninames --status
```

The command should generate an output similar to the following example:

```
omniNames ( pid 842 ) is running...
```

If the reported line is:

```
omniNames is stopped
```

you need to start omniNames manually using the following command. This command also displays its output when the omniNames daemon is successfully started:

```
# /opt/fse/bin/omninames --start
Starting omniORB Naming Service:           [  OK  ]
```

Checking FSE Processes

The status of FSE processes can be monitored using the `fse` command. Apart from checking the status, this command is also used for starting and stopping the FSE processes. Starting and stopping actions are only allowed to be executed by an FSE administrator, but all users can do a status check.

You can check the status of locally running FSE processes by running the `fse` command with the `--status` option:

```
# fse --status
```

The output of this command depends on the type of installation and is operating-system specific.

The next section contains outputs of the `fse --status` command when it is run on a particular component of the FSE installation for all supported platforms. You should check the status of the FSE processes and verify that the output you get corresponds to the appropriate example.

Checking FSE processes is the last step of the basic installation process. However, it is strongly recommended that you also perform the post-installation steps described in the next section.

For description of configuration procedures, refer to the *FSE User Guide*.

Example Outputs of the fse --status Command

If software installation was successful, you should get the following (typical) outputs with the `fse --status` command:

Consolidated Linux FSE installation FSE daemons running

```
fse-svc ( pid 17399 ) is running...
fse-rm ( pid 17411 ) is running...
fse-mif ( pid 17427 ) is running...
fse-fsevtmgr ( pid 17707 ) is running...
```

Linux FSE server FSE daemons running

```
fse-svc ( pid 17399 ) is running...
fse-rm ( pid 17411 ) is running...
fse-mif ( pid 17427 ) is running...
```

Linux FSE client, FSE daemons running

```
fse-svc ( pid 17399 ) is running...
fse-fsevtmgr ( pid 17707 ) is running...
```

Automating the Mounting of HSM File Systems

To mount HSM file systems automatically, add entries for these file systems to the local file-system table-file `/etc/fstab`:

1. Create a directory that will serve as a mount point for the HSM file system:

   ```
   # mkdir /fse/hsmfs_01
   ```

2. Add the following line to the `/etc/fstab` file:

   ```
   /dev/vg_hsmfs/hsmfs_01  /fse/hsmfs_01 hsmfs noauto  0 0
   ```

Note: You must use the values in the third[1], fourth[2], fifth, and sixth column as specified above. You may use different values in the first and second column according to your actual LVM volume configuration.

3. If necessary, create mount points and add the file system entries to the `/etc/fstab` file for all HSM file systems that you plan to use.

Note: You need to manually mount each HSM file system for the first time after you have configured the corresponding FSE partitions for these file system. This is a post-configuration step, described in depth in *FSE User Guide, Chapter 2*.

The entries in the `/etc/fstab` file enable the automatic mounting of the HSM file systems when FSE starts, and simplifies the manual mount of an unmounted HSM file system.

This completes the software installation process. See the *FSE User Guide, Chapter 2* to find out how to configure FSE resources such as disk media and tape libraries and for general configuration tasks. The next section describes how to configure post-start and pre-stop scripts.

Configuring the Post-Start and Pre-Stop Helper Scripts

You can set up two helper scripts to automatically perform arbitrary tasks at start-up and shut-down of the local FSE processes. These scripts are called post-start and pre-stop scripts, and are plain text files containing lists of commands to be run sequentially.

1. The keyword hsmfs in the third column refers to the type of file system. This is an HSM file system.
2. The keyword noauto refers to the file system mounting option. An HSM file system cannot be automatically mounted at system boot time before FSE's start-up.

Both scripts are executed by the `fse` command. If they are not present, their execution is simply skipped.

Note: The commands that you specify in the post-start and pre-stop scripts should not block the execution of the `fse` command. Therefore, they must conform to the following rules:

- They must not require interactive input.
- They must finish in a reasonable time and return the control to the script afterwards.

The Post-Start Script

The post-start script is executed by the `fse --start` command after all local FSE processes have been started and, if the local system is Linux, all HSM file systems with an entry in the `/etc/fstab` file have been mounted. The script therefore, runs the specified commands directly after this particular component of the FSE installation is put into its fully operational state.

The post-start script must be named `post_start.sh`. It has to be located on a local machine in the `/opt/fse/sbin` directory. The script must have execute permission.

The Pre-Stop Script

The pre-stop script is executed by the `fse --stop` command before all locally mounted HSM file systems are unmounted and before all FSE processes that are running locally are shut down. The script runs the specified commands directly before this particular component of the FSE is pulled out of its fully operational state.

The pre-stop script must be named `pre_stop.sh`. It must be located on a local machine in the `/opt/fse/sbin` directory. The script must have execute permission.

Installing FSE Software (Windows)

6

FSE software is installed by running the installation wizard from the Windows part of the FSE CD-ROM. The installation wizard guides you through the whole installation procedure and notifies you if any required third-party package is missing. It installs user-selected FSE packages and starts FSE processes after installation is finished.

Note: You need administrator privileges to perform the installation. These privileges are granted only if you are locally logged to the system as *Administrator*. Remote Desktop cannot be used for this task.

To install FSE software, you need to run the FSE installation wizard that is located on the Windows part of the FSE release installation CD-ROM. The installation wizard guides you through the whole installation procedure: it notifies you if any of the required third-party packages is missing, it installs the FSE software packages, and starts FSE processes after software installation is finished.

This chapter includes the following topics:

FSE Software: Release, Hot Fixes and FSE Patches

FSE software is distributed as an FSE release, patch, or hot fix. FSE patches and hot fixes are meant for fixing problems that emerged after the new FSE version was released. The next sections describe the differences between them and provide recommendations for their usage.

Release

Every new FSE release brings major new functionality. The FSE release installation process uses the native operating system installation method, that is RPM packages for Linux, and MSI packages and other files for Windows.

Hot Fixes

A hot fix is meant to fix a customer-specific problem. A hot fix provides binaries that must be installed on the FSE installation before the solution to the problem can be verified.

FSE customers can install several hot fixes on the same FSE installation; each hot fix solves a different problem. Hot fixes are not cumulative, but may overlap in one or more binaries included in different hot-fix packages. Therefore, hot fixes must be installed in the correct order.

Note: If the same binary is included in multiple hot fixes, then these hot fixes are cumulative for this particular binary only, and not for all included binaries. For example, if the `fse-bea` binary is included in hot fixes `fse31?-hot03lin`, `fse31?-hot07lin`, and `fse31?-hot09lin`, then the problem that was solved by `fse-bea` fix from `03` is also in `07` and `09`, but the `fse-bea` fix introduced in `09` is neither in `03` nor in `07`.

A hot fix consists of one or more updated files that are packed into an archived package: `zip` for Windows. The ReadMe file lists the problems solved by the hot fix and provides installation instructions. Readme filenames are based on the templates: `fse31?-hot<Number>win-readme.txt` for Windows hot fixes. The `<Number>` string in each template is the hot-fix label.

Patches

A patch provides the functionality of several hot fixes. It includes the updated binaries from all the hot fixes that have been released and confirmed by the time the patch was prepared. The patch also contains all other files that are provided by the FSE release software packages; it therefore replaces the entire FSE release fileset and must be installed in the same way as the FSE release packages.

Patches are cumulative. This means that a patch with a particular consecutive number contains all of the functionality of patches that are labelled with smaller consecutive numbers and supersedes all of them.

Note: Hot fixes are only meant to solve problems that emerge between releases of two consecutive patches. If several hot fixes and a single patch containing these hot fixes are are available, you are recommended to install the patch rather than the hot fixes.

Installing an FSE Release and FSE Patches

Installing an FSE Release on Windows

The FSE installation wizard lets you select the type of installation:

- **Complete:** designed for installation of a consolidated implementation. It installs the client and server parts of the software. By default, FSE installation files will be installed to `%Program Files%\Hewlett-Packard\FSE`.
- **Custom:** enables you to specify which particular packages you want to install: packages belonging to FSE server, packages belonging to the FSE client, or all packages. In this installation mode, you can also change the default installation directory.

Installing Server and Client Software on the Same Windows System

To install the FSE server and the FSE client software on the same Windows system, proceed as follows:

1. Insert the FSE Windows installation CD-ROM. The installation wizard starts automatically if Autostart option is enabled. Otherwise, run `setup.exe` from the installation CD-ROM. When the InstallShield Wizard displays, click **Next**.
2. Carefully read the license agreement. If you agree to the terms, confirm it, and click **Next** to continue.

3. If any of the required components are missing, FSE notifies you. Click **Continue**, if you intend to install the necessary components later. For details on required components, see “Required Packages for a Windows Operating System” on page 32.
4. In the Setup Type window, select **Complete** to install both the FSE server and the FSE client, and click **Next**.
5. The installation wizard automatically recognizes the fully-qualified domain name (FQDN) of the system you are installing to, and suggests it as a default value. Check the suggested name. **Note:** If you connect external FSE clients to this consolidated FSE installation using a private network connection, you must change the suggested value to the appropriate FQDN that identifies the system inside the private network. Click **Next**.
6. In the Ready to Install the Program window, click **Install** to begin the installation. This may take several minutes.
7. Click **Finish** to exit the wizard.
8. If you are installing FSE software to a Windows 2000 Server system, when prompted, restart the system.

As soon as the system is restarted, all necessary FSE processes on the server and client start automatically.

Installing Server and Client Software on Different Windows Systems

If you want to install the FSE server and FSE client on different Windows systems (where the client is an external client), proceed as follows:

1. Insert the FSE Windows installation CD-ROM. The FSE installation wizard starts automatically if the Autostart option is enabled. Otherwise run `setup.exe` from the installation CD-ROM. The InstallShield Wizard displays. Click **Next**.
2. Carefully read the license agreement. If you agree to the terms, confirm it, and click **Next** to continue. If any of the required components are missing, FSE notifies you about it. Click **Continue**, if you intend to install the necessary components later. For details, see “Required Packages for a Windows Operating System” on page 32.
3. In the Setup Type window, select **Custom** and click **Next**.

4. In the Custom Setup window, select the components you want to install. If you want to change the destination directory, click **Change**, browse to the new destination folder and click **OK**.

5. The installation wizard automatically recognizes the fully-qualified domain name (FQDN) of the system you are installing to and suggests it as a default value. If you are installing an FSE client, you must change the suggested value to the FQDN of the FSE server this FSE client will be connected to. **Note:** If the system (either the FSE server or the FSE client) you are installing to uses a private network connection for communication in the FSE system, you must change the suggested value to the appropriate FQDN that identifies the system inside the private network. Click **Next**.
6. Click **Install** to begin the installation. This may take several minutes. Then click **Finish** to exit the wizard.
7. If you have installed an FSE client software to a Windows 2000 Server system, restart your FSE client system when prompted. All mandatory FSE client processes are then started automatically.

   If you have installed an FSE server, the FSE server processes have already been started up and no system restart is necessary.

   On a consolidatyed FSE system, HSM services are not started by the installation so you need to start them manually. For details, see “Preparing the Environment for the First Start-up of the FSE Installation” on page 76

Installing FSE Patches

FSE patches are installed in the same way as FSE release software. You should always install the latest available patch. Consider the following, before and after installing a particular patch:

- An FSE patch may not be installed if another patch that is labelled with a bigger consecutive number has already been installed, except to fall back to the previous version if the patch produces new problems.
- An FSE hot fix may not be installed if a patch that includes this hot fix has already been installed.

Verifying and Repairing FSE Installation

If the FSE release, hot fixes, and patches have been installed correctly, the following procedures help identify the applied hot fixes and patches.

Determining the Build Number

The build number of the installed set of FSE files is unique. The build numbers of different patches are different. The build number of each FSE patch also differs from the initial FSE release build number. Therefore, the build number can be used to determine whether or not a patch has been installed, and if so, which one.

Note: Build numbers are the same for Linux and Windows installation packages.

To determine the build number:

1. In the Windows Control Panel, double-click **Add/Remove Programs**.
2. Double-click **Administrative Tools**.
3. Double-click **Services**.
4. Click **File System Extender**.
5. Click the **support information** link to display the FSE version information, including the build number.

Checking the Patches Against the Build Number

After the build number has been determined, check the issued patches against the build number. The ReadMe file of every patch contains the build number that it uses.

```
FSE_3.1_WIN     3.1.185
FSE_3.1_WIN_001 3.1-186
FSE_3.1_WIN_002 3.1-189
FSE_3.1_WIN_003 3.1-190
```

This example shows that on the Windows component of the FSE system, the patch `FSE_3.1_WIN_003` is installed, `FSE_3.1_WIN` is the base release version number.

Repairing the Installed Software

If the FSE release software gets corrupted, you need to repair the FSE installation by reinstalling the current FSE release or FSE patch packages. You can also use the repair procedure to uninstall all installed hot fixes. Proceed as follows:

1. Uninstall FSE from your Windows system. See "Uninstalling FSE Software from Windows" on page 90 for details.
2. Re-install FSE to your Windows system as described in "Installing an FSE Release on Windows" on page 69.

FSE Hot Fixes

This section tells you how to install, determine, and uninstall hot fixes.

Installing Hot Fixes

To install a hot fix, follow the installation instructions given in the respective ReadMe file. The following is an extract from a typical hot-fix Readme file:

```
----------------------------------------
FSE for Windows, version 3.0, HOT FIX 02
----------------------------------------
Copyright (c)2004 Hewlett-Packard
The next files are included.
  doc\fse21-hot02win-readme.txt
  bin\fsefile.exe
Size and date information is listed below.
Hot fix resolves the following problem(s):
  #1604: "new recompilation of a file"

Hotfix is based on version: 3.0.120 "PATCH_3.0_001"

Installation instructions:
1. Login as administrative user to FSE Windows system
2. Stop FSE processes.
     c:\hot> fse --stop
3. Run Task Manager and make sure no FSE processes ...
...
```

```
5. Make a backup copy of the file(s) that will be updated...
...
8. Start the FSE processes.
     c:\hot> fse --start

Note: the command UNZIP.EXE can be obtained at
http://www.info-zip.org, usually from
<http://www.info-zip.org/pub/infozip/UnZip.html#Win32>.
```

Note: If you skip step 5 from the hot fix installation instructions (backing up the files that will be updated), the only option for uninstalling the hot fix will be to repair the FSE release or patch installation. Note that this type of repair procedure uninstalls all installed hot fixes.

Determining the Installed Hot Fixes

You can differentiate the hot fix files from the FSE release or FSE patch installation files according to the dates the files were created. To get a list of the FSE installation files, proceed as follows:

1. In the Command Prompt, change current directory to the directory with FSE binary files. In place of the *%InstallPath%* variable, use the path you specified during installation, for example:

   ```
   C:\Documents and Settings\Administrator>cd %InstallPath%\bin
   ```

2. Enter the `dir` command as shown:

   ```
   %InstallPath%\bin>dir
   ```

   The following is a sample output of the `dir` command which has been run on the `C:\Program Files\Hewlett-Packard\FSE\bin` directory.

   ```
   Volume in drive C is system
    Volume Serial Number is 1858-EC10

    Directory of C:\Program Files\Hewlett-Packard\FSE\bin
   13.07.2004  05:44       <DIR>          .
   13.07.2004  05:44       <DIR>          ..
   09.07.2004  10:43                   362 checklic.cmd
   08.07.2004  10:41                 6.400 checklic.py
   08.07.2004  10:41                 4.020 dumprmdb.py
   08.07.2004  14:02                61.440 fse-arch.exe
   13.07.2004  05:44                46.843 fse-backup.py
   08.07.2004  14:02               352.256 fse-bea.exe
   ```

```
08.07.2004  14:02              49.152 fse-dd.exe
08.07.2004  14:02              90.112 fse-fsevtmgr.exe
08.07.2004  14:02             401.408 fse-hsm.exe
08.07.2004  14:02              81.920 fse-la-m.exe
08.07.2004  14:02             126.976 fse-la-s.exe
08.07.2004  14:02           1.122.304 fse-mif.exe
08.07.2004  14:02             634.880 fse-pm.exe
08.07.2004  10:41              19.139 fse-restore.py
08.07.2004  14:02             503.808 fse-rm.exe
08.07.2004  14:02             114.688 fse-svc.exe
08.07.2004  14:02              94.208 fse.exe
09.07.2004  12:37                 135 fsebackup.cmd
08.07.2004  14:02              86.016 fsebak.exe
25.07.2004  14:02              36.864 fsecheck.exe
08.07.2004  14:02              45.056 fsedrive.exe
08.07.2004  14:02              61.440 fsefile.exe
08.07.2004  14:02              40.960 fsejob.exe
```

3. Examine the dates the files were created. Files that were installed by the FSE release or an FSE patch have the same date. In the above example, the date of the initially installed files is 08/07/2004. The files that have been replaced by hot fixes have timestamps with later dates, for example, the `fsecheck.exe` was created on 25/07/2004.

Uninstalling Hot Fixes

An FSE hot fix can be uninstalled in two ways:

- Overwrite the hot-fix files with the backup copies of the initially installed files.

  A prerequisite for this type of uninstall operation is the backup copies of the initially installed files. These backup copies must have been created before the hot fix was installed.

- Repair the installation of the FSE release or an FSE patch as described in “Repairing the Installed Software” on page 73.

Note: By repairing the installation, all installed hot fixes, not just a single hot fix, are uninstalled.

To uninstall a hot fix using the backup copies of the initially installed files, proceed as follows:

1. Stop the FSE processes on all clients and then on the FSE server using the `fse --stop` command.
2. Copy original FSE release or FSE patch files from their backup location back to their original location.
3. Delete the backup copies of the original files and the backup directory.
4. Delete the hot fix ReadMe file from the *%InstallPath%*`\doc` directory on Windows.
5. Start the FSE processes on the FSE server and then on FSE clients using the `fse --start` command.

Preparing the Environment for the First Start-up of the FSE Installation

Before starting the FSE system for the first time, you need to configure the FSE interprocess communication. Help on FSE commands is available from the **Start** menu (**Programs** > **Hewlett-Packard** > **FSE** > **Docs**) as soon as FSE software is installed.

Modifying the PATH Environment Variable

To ease usage of FSE commands you need to extend the command search path with the directory containing FSE commands.

Check the PATH variable as follows:

1. Right-click **My Computer**, and then click **Properties**.
2. In System Properties, click the **Advanced** tab and then click **Environment Variables**.
3. Look for **System Variables**, select the **Path** variable, and then click **Edit**.
4. Check if *%InstallPath%*`\bin` is included in the search path.

Configuring the FSE Interprocess Communication

During the FSE installation procedure, the FSE software packages are installed on the hosts that will form the FSE installation. On each host, whether it is a consolidated FSE installation, an FSE server, or an FSE client, two

communication configuration files are installed. These plain text files store the configurable FSE interprocess communication settings. In certain FSE set-ups, you must manually modify one or both files to enable correct communication between FSE processes. Your actual FSE system deployment and the type of network that is used for FSE interprocess communication determines which specific modifications are required.

Note: An appropriate configuration of the FSE interprocess communication is of crucial importance for normal FSE operation. Incorrectly configured interprocess communication may lead to a non-operating FSE system.

These configuration files are located as follows:

Configuration File	Location
`services.cfg`	*`%InstallPath%`*`\etc`
`omniORB.cfg`	*`%InstallPath%`*`\etc`

You can change the default path where FSE system searches for the `omniORB.cfg` file using the `OMNIORB_CONFIG` environment variable.

Before modifying the configuration files on a Windows system, you must stop the FSE processes that have been automatically started after the installation of the FSE software packages. If the modifications on all hosts—the consolidated FSE installation or the FSE server and external FSE clients—are necessary, you must stop the processes on all external clients before stopping the processes on the consolidated system or the server. Use the `fse --stop` command for this purpose.

Note: In the following configuration procedures for LAN connection, if the system you are configuring has several network adapters enabled, you **must** configure the `omniORB.cfg` file as described in the private network communication configuration procedures, instead of renaming it.

In this case, the parameters you specify in `omniORB.cfg` must be verified against the actual LAN configuration for that system.

Configuring communication on a consolidated FSE installation or an FSE server

No External FSE Clients or Ordinary LAN Connection

If your FSE set-up includes only a consolidated FSE installation and you do not plan to connect external clients to it, or if your external FSE clients are connected to the consolidated FSE installation or the FSE server through ordinary LAN, you do not need to modify the default configuration of the `services.cfg` file. Instead, perform the following:

- Rename `omniORB.cfg` on the consolidated FSE system or the FSE server (for example to `omniORB.bak`), so that you will be able to retrieve it later, if needed.

Private Network Connection

If your external FSE clients use a private network for communication with the consolidated FSE installation or the FSE server, you must make the following modifications to the consolidated FSE system or to the FSE server:

- Add the *`hostname`* variable to `services.cfg` and provide as its value the fully-qualified domain name (FQDN) that identifies the system inside the private network.

  The following is an example of a correctly configured `services.cfg` file in an FSE installation using a private network. The *`server`* variable is redundant in this situation:

  ```
  hostname = fseserver.fsenet
  server = private-server.fsecompany.com
  ```

- Modify the following parameters in the `omniORB.cfg` file: the FQDN that identifies the system inside the private network, IP address of the system, and the subnet mask. All these parameters must be verified against the actual private network configuration. Make sure that the FQDN you specify in `omniORB.cfg` matches the FQDN specified for the *`hostname`* variable in the `services.cfg` file.

  The following is an example of a correctly configured `omniORB.cfg` file:

  ```
  # Which interface omniORB uses for IORs

  endPoint = giop:tcp:fseserver.fsenet:

  # The order of network interfaces to use for accepting
  connections:
  # Only localhost and private network. Others are denied.
  ```

```
clientTransportRule = localhost tcp
clientTransportRule = 192.168.240.0/255.255.255.0 tcp
clientTransportRule = * none

# The order of network interfaces to use for opening new
connections:
# Only localhost and private network. Others are denied.

serverTransportRule = localhosttcp
serverTransportRule = 192.168.240.0/255.255.255.0 tcp
serverTransportRule = * none
```

Configuring communication on external Windows FSE clients

Ordinary LAN Connection

If the external Windows FSE clients and the consolidated FSE system or the FSE server communicate through the ordinary LAN, you do not need to modify the default configuration of the `services.cfg` file on external Windows FSE clients. However, you have to perform the following step:

- Rename the `omniORB.cfg` file on each external Windows FSE client (for example to `omniORB.bak`), so that you will be able to retrieve it later, if needed.

Private Network Connection

If the external Windows FSE clients and the consolidated FSE system or the FSE server communicate through a private network, you need to modify both configuration files, `services.cfg` and `omniORB.cfg`, on each external Windows client. The following procedure includes the necessary modification steps:

1. Add the *`hostname`* variable to `services.cfg` and provide as its value the FQDN that identifies this Windows-Linux FSE client system inside the private network.

   The following is an example of a correctly configured `services.cfg` using a private network:

   ```
   hostname = fse-win-client.fsenet
   server = private-server.fsenet
   ```

   Note that the *`server`* variable was already correctly configured by the FSE installation wizard.

2. Modify the following parameters in the `omniORB.cfg` file: the FQDN that identifies the consolidated FSE installation or the FSE server inside the private network, IP address of such system, and the subnet mask. All these parameters must be verified against the actual private network configuration. Ensure that the FQDN you specify in `omniORB.cfg` matches the FQDN specified for the *`server`* variable in the `services.cfg` file.

   The following is an example of a correctly configured `omniORB.cfg` file:

```
# Which interface omniORB uses for IORs

endPoint = giop:tcp:fseserver.fsenet:

# The order of network interfaces to use for accepting
connections:
# Only localhost and private network. Others are denied.

clientTransportRule = localhost tcp
clientTransportRule = 192.168.240.0/255.255.255.0 tcp
clientTransportRule = * none

# The order of network interfaces to use for opening new
connections:
# Only localhost and private network. Others are denied.

serverTransportRule = localhosttcp
serverTransportRule = 192.168.240.0/255.255.255.0 tcp
serverTransportRule = * none
```

Starting the FSE Installation

On a Windows system, FSE services and processes are started automatically by the FSE Windows service after system reboot.

You must start the consolidated FSE installation or the FSE server first. When the FSE processes on this system are running, start the external clients.

Starting FSE Processes on Windows Manually

To manually start a consolidated FSE installation, an FSE server, or FSE client processes, use either of the following methods:

- Run the `fse --start` from *`%InstallPath%`*`\bin` directory.

The following shows the command being run from the default `Program Files\Hewlett-Packard\FSE\bin` directory:

```
C:\Program Files\Hewlett-Packard\FSE\bin>fse --start
FSE Windows Service started.
```

- Start the FSE service using the Services administrative tool. Run the Services tool by clicking **Start** > **Settings** > **Control Panel** > **Administrative Tools** > **Services**.

Changing the Startup Type

You can change the way FSE processes are started by changing the startup type for FSE services using Windows Services tool:

1. In the Windows Control Panel, double-click **Administrative Tools**, and then double-click **Services**.
2. In the Name column, right-click File System Extender, and then click **Properties** to open the Automatic Updates Properties window.
3. Under General, select the **Startup Type** option you prefer (Automatic, Manual, or Disabled).

Checking the Status of a Running FSE Installation

After you have started FSE processes on all machines that are part of the FSE installation, you can verify that the Firebird SuperServer and the omniNames daemon are running on the consolidated installation or the FSE server, and that the FSE processes are running on all FSE hosts.

FSE systems require the Firebird SuperServer (*FirebirdSS*) to be running on the consolidated FSE system or the FSE server in order to manage the Resource Management Database (RMDB). Firebird SuperServer is started automatically at the end of the Firebird's RPM package installation.

omniNames is the CORBA Naming Service daemon that allows FSE processes to communicate between each other. It must be running on the FSE server's host, that is, on the consolidated FSE installation or on the FSE server system.

Checking Firebird SuperServer on a Windows Server

Check if the Firebird Server is running using Windows Services tool:

1. In Windows Control Panel, double-click **Administrative Tools**, and then double-click **Services**.
2. Look for the Firebird Server entry. If Firebird is not running, right-click its entry, and click **Start**.

Checking the omniNames Daemon on a Windows Server

The omniNames daemon runs as a service. You can check the status of the daemon using the Windows Services tool:

1. In Windows Control Panel, double-click **Administrative Tools**, and then double-click **Services**.
2. Look for the `omniOrb CORBA Naming Service` entry. The service status should be set to `Started`.
3. If the service status is set to `Stopped`, omniNames is not running. In this case, open the Command Prompt and use the `omninames --start` command to start omniNames.

Checking FSE Processes

The status of the FSE processes can be monitored using the `fse` command. Apart from checking the status, this command is also used for starting and stopping the FSE processes. Starting and stopping actions are only allowed to be executed by an FSE administrator, but all users can do a status check.

You can check the status of locally running FSE processes by running the `fse` command with the `--status` option:

```
fse --status
```

The output of this command depends on the type of installation, and is operating-system specific.

The next section contains outputs of the `fse --status` command when it is run on a particular component of the FSE installation for all supported platforms. You should check the status of the FSE processes and verify that the output you get corresponds to the appropriate example.

Checking FSE processes is the last step of the basic installation process. However, it is strongly recommended that you also perform the post-installation steps described in the next section.

For a description of configuration procedures, refer to the *FSE User Guide*.

Example Outputs of the fse --status Command

If software installation was successful, you should get the following (typical) outputs with the `fse --status` command:

Consolidated Windows FSE installation, FSE daemons running

```
FSE Windows Service (fse.exe): Running.
OMNI Naming Service (omniNames.exe): Running
FSE Service (fse-svc.exe): Running.
FSE Management Interface (fse-mif.exe): Running.
FSE Resource Manager (fse-rm.exe): Running.
FSE FS Event Manager (fse-fsevtmgr.exe): Running.
```

Windows FSE server, FSE daemons running

```
FSE Windows Service (fse.exe): Running.
OMNI Naming Service (omniNames.exe): Running
FSE Service (fse-svc.exe): Running.
FSE Management Interface (fse-mif.exe): Running.
FSE Resource Manager (fse-rm.exe): Running.
```

Windows FSE client, FSE daemons running

```
FSE Windows Service (fse.exe): Running.
FSE Service (fse-svc.exe): Running.
FSE FS Event Manager (fse-fsevtmgr.exe): Running.
```

Automating the Mounting of HSM File Systems

In general, mounting disk volumes is performed by Windows automatically, if a drive letter or mount point is defined for a disk volume.

FSE systems support mounting an HSM file system to a drive letter, as well as mounting it to an empty subdirectory in the NTFS directory tree.

A Windows physical disk can be subdivided in volumes. Each volume has a unique volume ID, such as `Volume{729f2319-ba82-11d7-a2d5-00e01884ee37}`. These volume IDs only change when the volume is formatted. You get this unique volume ID by using the `mountvol` command.

Note: Windows FSE clients use volume IDs for identifying the disk volumes of the configured FSE partitions. Volume IDs are volume name strings without the `\\?\` prefix and the trailing backslash.

Whether a new disk volume was created using the procedure described in "Configuring a Separate Volume for an HSM File System" on page 42, or an existing NTFS volume is used, mounting an HSM file system consists of two separate operations:

1. Detachment of NTFS, the Windows native file system, from the volume.
2. Mounting the volume through the HSM file system filter.

Mounting Volumes for HSM File Systems

Mounting a disk volume through the HSM file system filter can be triggered implicitly or explicitly, provided that NTFS has already been detached from the volume. Implicit mount is performed automatically when an object on the volume is accessed. Explicit mount can be triggered manually by the FSE administrator, using FSE command-line interface.

Regardless of the type of mount, a disk volume can be mounted in Limited Access Mode (LAM) or Full Access Mode (FAM). For more information on HSM file system access modes, refer to the *FSE User Guide*.

Configuring Mount Points for FSE Partitions and Mounting the Corresponding Volumes

Before you start, make sure of the following:

- FSE processes on the respective FSE client and FSE server must be running.
- If the FSE server and the FSE client are running on different hosts, the network connection between the two hosts must be established.
- The FSE partition must not be configured on the FSE server.

To automate mounting of the HSM file systems on a Windows client, proceed as follows:

1. On the FSE client, in the command prompt, run the `mountvol` command. In the command output, select the volume that will store the HSM file system. The following is an example of running `mountvol` and the relevant part of the `mountvol` output:

   ```
   C:\Program Files\Hewlett-Packard\FSE\bin>mountvol
   ```

```
...
Possible values for VolumeName along with current mount points
are:
    \\?\Volume{97d09c72-b208-11d7-8f8b-806d6172696f}\
        C:\

    \\?\Volume{97d09c73-b208-11d7-8f8b-806d6172696f}\
        D:\

    \\?\Volume{f6f3e1b6-b2ac-11d7-9c99-00b0d02fadef}\
        D:\hsm_fs_folder

    \\?\Volume{97d09c71-b208-11d7-8f8b-806d6172696f}\
        F:\

    \\?\Volume{97d09c70-b208-11d7-8f8b-806d6172696f}\
        A:\
```

2. In the above example, copy the `\\?\Volume{<VolumeGUID>}\` value above the line `D:\hsm_fs_folder`:

   ```
   \\?\Volume{f6f3e1b6-b2ac-11d7-9c99-00b0d02fadef}\
   ```

3. On the FSE server, specify the volume ID without the leading `\\?\` string and the trailing backslash as the value of the *`FileSystemID`* variable of the corresponding FSE partition configuration file.

The following section of the partition configuration file is an example of the required volume ID:

```
#
Name = "win-ext"
#
# Where is the HSM file system?
#
Client "client.company.de"
{
FileSystemID="Volume{f6f3e1b6-b2ac-11d7-9c99-00b0d02fadef}"
```

4. On the FSE server, add new FSE partition to the FSE system using the following:

   ```
   # fsepartition --add <PartitionCfgFileName>
   ```

   Once the partition is added, the new Partition Manager is started for the newly configured partition.

5. On the FSE client, run the `fse --dismount-ntfs` command to detach the automatically attached NTFS from the HSM file system. Specify the volume name in the form of `\\?\volume{<VolumeGUID>}\`:

   ```
   C:\Program Files\Hewlett-Packard\FSE\bin>fse --dismount-ntfs
   \\?\Volume{f6f3e1b6-b2ac-11d7-9c99-00b0d02fadef}\
   ```

   Now the HSM file system is ready for use. It is mounted automatically when some file or directory on it is accessed for the first time. Alternatively, you can use the following command to mount the HSM file system immediately:

   ```
   C:\Program Files\Hewlett-Packard\FSE\bin>fse --mount
   D:\hsm_fs_folder \
   \\?\Volume{f6f3e1b6-b2ac-11d7-9c99-00b0d02fadef}\
   ```

Note: Do not use the `mountvol` command for mounting and dismounting the HSM file system, nor for managing FSE partitions. The commands `fse --mount` and `fse --umount` have been designed for this purpose. They can be used for mounting HSM file systems explicitly, and must be used when disabling, enabling, and removing FSE partitions.

This completes the software installation process. See the *FSE User Guide*, *Chapter 2* to find out how to configure FSE resources such as disk media and tape libraries and for general configuration tasks. The next section describes how to configure post-start and pre-stop scripts.

Configuring the Post-Start and Pre-Stop Helper Scripts

You can set up two helper scripts to automatically perform arbitrary tasks at start-up and shut-down of the local FSE processes. These scripts are called post-start and pre-stop scripts, and are plain text files containing lists of commands to be run sequentially.

Both scripts are executed by the `fse` command. If they are not present, their execution is simply skipped.

Note: The commands that you specify in the post-start and pre-stop scripts should not block the execution of the `fse` command. Therefore, they must conform to the following rules:

- They must not require interactive input.
- They must finish in a reasonable time and return the control to the script afterwards.

The Post-Start Script

The post-start script is executed by the `fse --start` command after all local FSE processes have been started and, if the local system hosts HSM file systems, after these file systems have been switched from LAM to FAM. The script therefore, runs the specified commands directly after this particular component of the FSE installation is put into its fully operational state.

The post-start script must be named `post_start.cmd` and located in the *`%InstallPath%`*`\bin` directory on the local system (default path is `Program Files\Hewlett-Packard\FSE`).

For information on HSM file system access modes (LAM, FAM), see the *FSE User Guide*.

The Pre-Stop Script

The pre-stop script is executed by the `fse --stop` command before all local HSM file systems are switched from FAM to LAM, and before FSE processes that are running locally are shut down. The script runs the specified commands directly before this particular component of the FSE is pulled out of its fully operational state.

The pre-stop script must be named `pre_stop.cmd` and located in the *`%InstallPath%`*`\bin` directory on the local system. By default, *`%InstallPath%`* is *`%Program Files%`*`\Hewlett-Packard\FSE` unless you chose Custom setup type in the FSE installation wizard and changed it.

For information on HSM file system access modes (LAM, FAM), see the *FSE User Guide*.

Uninstalling FSE Software

7

If you want to remove the FSE software from your installation, you need to uninstall all FSE components.

Note: In a distributed FSE system the sequence of uninstalling from different hosts that are part of the FSE system matters. If external FSE clients are part of your FSE system, you have to uninstall the FSE software from the external clients *before* uninstalling the consolidated FSE system or the FSE server.

Uninstalling FSE Software from Linux

Note: You must be logged on to the system as root in order to execute shell commands.

To remove the FSE components from a Linux operating system, proceed as follows:

1. Stop the FSE processes using the `fse --stop` command. The command and output is shown in the following:

```
# fse --stop
Unmounting FSE File Systems:                [  OK  ]
Stopping FSE FS Event Manager:              [  OK  ]
Unloading HSM FS Filter module:             [  OK  ]
Stopping FSE Management Interface:          [  OK  ]
Stopping FSE Resource Manager:              [  OK  ]
Stopping FSE Service:                       [  OK  ]
```

   The `fse --stop` command executes the `pre_stop` script, if it exists. It also performs the following, depending on where it is run:

   - When used on a consolidated installation or an external FSE client, it unmounts all local mounted HSM file systems.
   - Terminates the respective consolidated FSE installation, FSE server or FSE client operation by shutting down all running FSE processes on the consolidated FSE installation, FSE server, or FSE client.

2. If you are uninstalling a consolidated FSE installation or an FSE server, stop the omniNames daemon. The command and output is shown in the following:

   ```
   # omninames --stop
   Stopping omniORB Naming Services [ OK ]
   ```

3. Run the following command to remove all FSE packages from the system:

   ```
   rpm --uninstall `rpm -qa | grep "^fse-" | grep -v fse-gui`
   ```

4. If FSE hot fixes have been installed, manually remove the backups of the original FSE release or FSE patch files from their backup location, the backup directory itself, and the hot fix ReadMe files from the `/opt/fse/doc` directory.

5. Remove the following components from the FSE installation manually:

   - Resource Management Database (RMDB)
   - File System Catalog (FSC)
   - Hierarchical Storage Management Database (HSMDB)
   - Configuration database (CfgDB)
   - Log and debug files (in the `var/opt/fse` directory).

Optionally, you can also remove all the installed third-party software packages that are required by the FSE installation, provided that you do not need them for other purposes.

Uninstalling FSE Software from Windows

Note: You need to have the administrator's rights in order to perform the necessary steps.

To remove the FSE components from a Windows operating system, proceed as follows:

1. Stop the local FSE processes with the `fse --stop` command, as follows:

   ```
   C:\>fse --stop
   FSE Windows Service stopped.
   ```

   The `fse --stop` command executes the `pre_stop` script, if it exists. It also performs the following, depending on where it is run:

   — When used on a consolidated FSE system or an external FSE client, it switches all local mounted HSM file systems from FAM to LAM.

For information on HSM file system access modes (LAM, FAM), refer to the *FSE User Guide*.

— It terminates the appropriate consolidated FSE system, FSE server or FSE client operation by shutting down all running FSE processes on the system, server or client.

2. In the Windows Control Panel, click **Add/Remove** Programs.
3. Select `File System Extender` and click **Remove**.
4. When uninstallation is complete, click **Finish**.

Note: The uninstallation only removes files and directories that were created during installation of FSE. Files created later, during operation of FSE, and directories containing these files are not removed. You need to remove these files and directories manually.

Optionally, you can also remove all the installed third-party software packages that are required by the FSE installation, provided that you do not need them for other purposes.

Solving Installation Problems

You may encounter problems during the FSE installation process. Before you contact support, you should verify that all the prerequisites are met and that you have followed the installation procedure as described in this guide, including, for example, the operating system preparation phase. See also the *Release Notes* for any installation-related problems.

Linux Systems

Problem: Shell Command returns “Permission denied” or Similar Message

Make sure you are logged on as root user. You can check this with the command below:

```
# whoami
root
```

If the command responds with the user name other than `root`, log out from the system and log in again with the `root` user name. Repeat the installation step that failed.

Windows Systems

Problem: InstallWizard returns an error

While installing a Windows FSE client the FSE installation wizard may display an error message and interrupt the installation process. To resolve the problem, proceed as follows:

1. In the *`%SystemDrive%`*`\` directory, locate `fse-install.log` and copy it to another location. *`%SystemDrive%`*`\` usually equals `c:\`.
2. Check that all prerequisites have been met.

   See “Required Packages for a Windows Operating System” on page 32 to check the requirements.

3. From the Windows part of the FSE installation CD, run `setup.exe` again.

   If you are still not able to install FSE successfully, send the copy of the log file `fse-install.log` that you created in step 1, and send it HP technical support.

FSE Installation Script (Linux)

The FSE installation script helps to speed-up the installation of FSE software on Linux systems. The installation is controlled by configuration files.

Caution: The FSE installation script can only be used for the first, clean installation of the FSE software. Do not use it for upgrading a system where an older FSE release is already installed.

Prerequisites

- You must be logged on to the system as root.
- Python interpreter must be installed. See "Preparing Linux Operating Systems" on page 27 for information on the required version of Python.

The package consists of:

- The main script named `hsminstall.py`
- The script `installsp3` *(for SUSE LINUX systems only)*
- The script `LogLiteEx.py`
- Configuration file `hsminstall.cfg`
- Configuration file `packagelist.cfg`. *(for SUSE LINUX systems only)*

Usually, only the configuration file `hsminstall.cfg` needs to be checked and customized.

On SUSE LINUXsystems:

1. The FSE-specific file systems are created.
2. YaST is used to install additional packages of the distribution.
3. The script `installsp3` is run. This checks for SLES 8 SP3 and installs it, if necessary.
4. If the kernel has to be upgraded as part of the SLES 8 SP3 installation, the script automatically restarts the system after the kernel packages are installed.

   In this case, once the system is running again, the installation script has to be re-run to continue with the installation of the Firebird database server as well as the FSE packages themselves.

5. The environment of the *root* account is updated to set the paths for the FSE commands and the FSE man pages.

Note: On a SUSE LINUX system, if you have installed Service Pack 3 for SUSE LINUX Enterprise Server 8 (SLES 8 SP3) in advance, you have to install it again after the FSE installation script has completed the installation procedure. This will upgrade the third-party software packages to the corresponding SP3 versions.

For information on how to manually upgrade SUSE LINUX Enterprise Server 8 with Service Pack 3, see the Appendix "Installing SLES 8 Service Pack 3" on page 109.

On Red Hat Linux systems:

1. The FSE-specific file systems are created.
2. The Firebird database server is installed, followed by the FSE software packages.
3. The environment of the `root` account is updated to set the paths for the FSE commands and the FSE man pages.

Installation Script hsminstall.py

To start the installation, enter `python hsminstall.py` at the command prompt.

The script can be called with the following optional parameters:

Parameter	Description
`/Path_to_configdir`	If no path is given, the configuration files are searched in the directory containing the script. The configuration directory needs to be writable to allow writing of the installation log and the creating of temporary mount points for NFS-mounted file systems.
`--check | -c`	Checks if the configuration file is syntactically correct.
`--trace | -t`	Switches on the trace output.
`--debug | -d`	Switches on the debug output.
`--help | -h`	Shows help text on the specified parameter.

Configuration Files

The hsminstall.cfg File

The main configuration file is `hsminstall.cfg`. It is built like a Windows native INI file. The following conventions are used:

- Comments start with #
- Sections are started by the section header in square brackets and continue to the next section header
- Lines that are not comments and do not hold a section header contain strings of the form `key = value`
- If the value contains subsections, they need to be held by braces and separated by commas, as shown:

  On SUSE LINUX systems:

  ```
  Packages    = { Linux, 3PartyCD, FseStandaloneCD }
  ```

  On Red Hat Linux systems:

  ```
  Packages    = { 3PartyCD, FseStandaloneCD }
  ```

  These subsections must be defined in the configuration file.

Predefined Sections

There are three predefined sections: *LVM*, *Packages*, and *Environment*.

LVM

In the default configuration, the LVM section consists of the two subsections: *SysLVM* and *HsmFsLVM*.

Each subsection describes one physical volume. The required entries are:

- Physical Volume

  The entry identifies the disk partition on which the physical volume is created.

- Volume Groups

  Usually, only one volume group is defined to hold the logical volumes.

- Logical Volume

  Normally, logical volumes are defined as subsections. Each subsection for a logical volume needs a unique name. In each subsection you need to define the following keys:

— Name

The name of the logical volume.

— Size

The volume size, for example, `800M` or `50G`.

— Mount

The mountpoint relative to `/var/opt`, for example, `fse` gives `/var/opt/fse`.

— FileSystem

If no file system is specified an Ext3 file system will be created. The only possible values are `ext2` and `ext3`.

Optionally you can define the keys:

— Number

This key lets you change the number of inodes for the file system which marks the number of files or directories this file system can hold. Otherwise, the default setting is used.

— Options

You can give all valid mount options for the specified file system type. For example, for Ext3 specify `data=journal` to make the journaling more safe but a bit slower.

Packages

Usually, the section Packages contains subsections `Linux`, `3Party` and, depending on the type of FSE installation about to be installed, `FseStandalone`, `FseClient` or `FseServer`.

The following keywords are recognized:

- FileList

  The rpm packages listed in this file will be installed using `yast`.

- nfsserver

  The server when installing from an NFS-share.

- rpminstpath

  The path to search for the following package list.

- PackageList

  List of packages to install using rpm, enclosed in {}, comma-separated.

- PostCommand

  Path to a script that will be executed after the installations.

The names of the subsections can be user-defined if the corresponding section header exists in the configuration file.

On SUSE LINUX systems:

- `Linux` subsection installs additional packages for the OS using `yast`.

  The installation source is the same as for the basic OS installation, the configuration file may be given in the section `Linux` of `hsminstall.cfg`.

- To be able to run the installation script for SLES 8 SP3, the Packages section must have the additional key:

  ```
  PostCommand = "path_to_script param1"
  ```

  where `path_to_script` is a relative or absolute path to a script that will be called after the action of this subsection has been done.

  The script `installsp3` installs the Service Pack 3 for SUSE LINUX Enterprise Server 8. This script expects one parameter to describe the installation source. Possible values are:

  - `cdrom` to try to mount the SP3 CD in the CD-ROM drive, check for, and start the installation script.
  - `local_path` expects the ISO image of the SP3 CD in the given path.
  - `server:/remote_path` tries to mount the given NFS share onto the mount point `/media/cdrom` and checks for, and starts the installation script.

  The script is used with the `hsminstall.py` script to upgrade the newly installed packages if necessary. If the SP3 was installed before `hsminstall.py` was started, no reboot is necessary.

  An error is logged if the file doesn't exist or the return code is not `0`, and the installation is terminated. Example:

  ```
  #-------------------------------------
  # Packages list for LINUX
  #-------------------------------------
  [Linux]
  FileList = ./packagelist.cfg
  PostCommand = "./installsp3 cdrom"
  ```

Common

- `3Party` is used for installation of packages like the Firebird database server or Samba. You have two possibilities to name the path to the source.

If the source is on the local filesystem you must add the line:

`rpminstpath = path_to_source`

where `path_to_source` can be absolute (with a leading "`/`") or relative to the directory where the installation script has been copied.

If the source is on an NFS server and you want the script to temporarily mount it during the installation, you have to enter an absolute path and the key `nfsserver = name_or_ip` for the server. This only works if the NFS partition is exported for the client you install.

- `FseStandalone`, `FseServer`, and `FseClient` refer to the packet selection of the respective FSE installation. The sources may be local or on an NFS server.

Environment

To enable the root account to use FSE tools some entries have to be added to the Environment section.

The following are valid keys for this section:

- File

  Names the configuration file to change. Normally, this file is `/root/.bashrc`

- Path

  The paths in braces will be added to `$PATH`.

- Manpath

  The paths in braces will be added to `$MANPATH`.

Example for hsminstall.cfg

```
#-------------------------------------------------------------
# Configuration file of the HSM LINUX installation V 3.0
#-------------------------------------------------------------
# Machine name: linux (Entry point)
#
#-------------------------------------
[linux]                                              # hostname
#Packages   = { Linux , Firebird, HSMServer }        # Package
list
#Packages   = { Linux, FirebirdNFS, HSMStandaloneNFS }
# Package list when installing over NFS
Packages    = { Linux, Firebird, HSMStandalone }
#Packages   = { Linux, Firebird, HSMClient }
LVM         = { SysLVM }
#LVM        = { SysLVM, HsmFsLVM}                   # LVM list
```

```
Environment = { Environment }                    # Environment
variable list



#--------------------------------------
# LVM area for fse administration data
#--------------------------------------
[SysLVM]
PhysicalVolume  = sda6       # initialize physical volumes on
device /dev/sda6
VolumeGroups    = fse_sda    # name of logical volume groups
LogicalVolume   = { HsmVar, HsmPart,HsmLog }
                        # name, size and mount point of logical
volumes

[HsmVar]
Name        = fsevar            # name of the partition
Size        = 4G                # size of partition
Mount       = fse               # mount point
FileSystem  = ext3              # type of file system
#Number      = 20000            # number of files in the file
system


[HsmPart]
Name        = fsepart           # name of the partition
Size        = 4G                # size of partition
Mount       = fse/part          # mount point
Options     = rw,data=journal  #
                                # default of file system is ext3
[HsmLog]
Name            = fselog        # name of the partition
Size            = 4G            # size of partition
Mount           = fse/log       # mount point
FileSystem      = ext3          # type of file system
Options         = rw            #

#--------------------------------------
# LVM area for FSE file system
#--------------------------------------
[HsmFsLVM]
PhysicalVolume  = sdb1        # initialize physical volumes on
device /dev/sdb
VolumeGroups    = fse_sdb     # name of logical volume groups

LogicalVolume   = { HsmDiskBuf }
```

```
[HsmDiskBuf]
Name        = fsediskbuf       # name of the partition
Size        = 59G              # size of partition
Mount       = fse/diskbuf      # mount point

#-------------------------------------
# Packages list for LINUX
#-------------------------------------
[Linux]
FileList      = ./packagelist.cfg
#PostCommand   = ./installsp3 tuxfse03:/var/img/slesSP3
PostCommand   = ./installsp3 cdrom
#


#-------------------------------------
# Firebird Modules NFS
#-------------------------------------
[FirebirdNFS]
nfsserver          = 10.1.251.73
rpminstpath        = /var/img/3party
PackageList        = {FirebirdSS-1.0.3.972-0.i386.rpm}

#-------------------------------------
# Firebird Modules
#-------------------------------------
[Firebird]
#nfsserver         = ""
rpminstpath        = 3Party/Firebird
PackageList        = {FirebirdSS-1.0.3.972-0.i386.rpm}

#-------------------------------------
# FSE Modules for the Standalone FSE System
#-------------------------------------
[HSMStandaloneNFS]
nfsserver          = 10.1.251.73
rpminstpath        = /var/img/fse.3.0
PackageList        = {fse-common.rpm, fse-server.rpm,
fse-agent.rpm,
                     fse-cli-admin.rpm, fse-client.rpm,
fse-cli-user.rpm }

#-------------------------------------
# FSE Modules for the Standalone FSE System
#-------------------------------------
[HSMStandalone]
#nfsserver     = ""
rpminstpath    = fse
```

```
PackageList    = {fse-common-3.0-153.i386.rpm,
fse-server-3.0-153.i386.rpm,
                  fse-agent-3.0-153.i386.rpm,
fse-cli-admin-3.0-153.i386.rpm,
                  fse-client-3.0-153.i386.rpm,
fse-cli-user-3.0-153.i386.rpm }

#-------------------------------------
# FSE Modules for the FSE Client over NFS
#-------------------------------------
[HSMClientNFS]
nfsserver          = 10.1.251.73
rpminstpath        = /var/img/fse.3.0
PackageList        = {fse-common.rpm, fse-client.rpm,
fse-cli-user.rpm }

#-------------------------------------
# FSE Modules for the FSE Server over NFS
#-------------------------------------
[HSMServerNFS]
nfsserver     = 10.1.251.73
rpminstpath   = /var/img/fse.3.0
PackageList   = {fse-common.rpm, fse-server.rpm, fse-agent.rpm,
                 fse-cli-admin.rpm }

#-------------------------------------
# FSE Modules for the FSE Server
#-------------------------------------
[HSMServer]
#nfsserver    = ""
rpminstpath   = fse
PackageList   = {fse-common-3.0-153.i386.rpm,
fse-server-3.0-153.i386.rpm,
                 fse-agent-3.0-153.i386.rpm,
fse-cli-admin-3.0-153.i386.rpm }

#-------------------------------------
# Environment1 area for FSE system
#-------------------------------------
[Environment]
File          = /root/.bashrc
Path          = { /opt/fse/sbin, /opt/fse/sbin/tools }
Manpath       = { /opt/fse/man }            #
```

The FileList File (Defaults to packagelist.cfg)

On SUSE LINUX systems:

The configuration file name for additional Linux packages is defined in the `hsminstall.cfg` file in the section `[Linux]`. The default value is `./packagelist.cfg`.

When you need to change this list you must copy both configuration files into a local writable directory and call the script with reference to this directory.

The *`FileList`* variable contains package names without version and build information, for example:

```
glibc-locale
tcpdump
rsync
binutils
```

Installation Examples

Installing from the Installation CD

Insert the Installation CD in the CD-ROM and mount it. Use the following command for mounting:

On SUSE LINUX systems:

```
# mount /media/cdrom/
```

On Red Hat Linux systems:

```
# mount /mnt/cdrom
```

The binaries and default scripts are located in the `/media/cdrom` directory. Copy them to a local filesystem, such as `/opt/fse/install`.

After `/opt/fse/install` is created and able to hold another 80 MB of data, copy the contents of the CD-ROM to disk using the following commands:

```
# cd /opt/fse/install
# bash /media/cdrom/install.sh
```

Check `hsminstall.cfg` located in `/opt/fse/install` directory to see if changes need to be made. Usually, you only need to change the settings for the host name and paths to the sources. For more details, see “Configuration Files” on page 97.

Start the installation by executing the following command:

```
# python hsminstall.py
```

The output of the script will be displayed. You can also check it later in the `hsminstall.log` file in the configuration directory.

On SUSE LINUX systems:

If Linux was installed from a CD-ROM, the YaST installation will ask for the SLES 8 installation CDs to install additional Linux packages. YaST will display its output on the screen and log its actions in the `hsminstall.log` file.

Installing from a NFS Mount Point

The installation can be executed over the network if the target computer has access to the NFS server that contains the installation sources. To install the FSE software release from a NFS server, follow the steps below.

1. Copy the contents of the FSE installation CD-ROM to a directory on the NFS server, and, while preserving the directory structure of the installation CD-ROM, export this directory.
2. Mount the exported file system:

   ```
   # mount <NFSServer>:<PathToInstallationDirectory> \
          /mnt/<MountPoint>
   ```

3. Copy the contents of Installation CD from the exported directory on the NFS server to the local `/opt/fse/install` directory:

   ```
   # bash /mnt/<MountPoint>/install.sh
   ```

In the configuration file, you can use the installation settings from the CD-ROM. Start the installation with the following command:

```
# python hsminstall.py
```

Installing FSE on Existing File Systems

B

When FSE is installed on an existing file system, it is necessary to bring existing files under FSE control. This is to make FSE aware that these files are already on the system and should be included in standard operations such as migration and restore.

Note: The following steps are for guidance only. Full procedures are documented in the *FSE User Guide, Chapter 2.*

Installing FSE on an Existing Linux System

The following procedure summarizes the steps to convert a Linux ext2 file system (ext2 FS) to a Linux ext3 FSE file system.

If necessary, first convert the ext2 file system to an ext3 file system:

1. Unmount the existing file system
2. Convert ext2 FS to ext3 FS using the command:

   ```
   tune2fs -j logical_volume_device
   ```

   for example:

   ```
   tune2fs -j /dev/fse_sda/fs1
   ```

Next, convert the ext3 file system to an ext3 FSE file system:

1. Prepare a new partition on the server side
2. Add this partition
3. Create a mount point (directory) and mount the above prepared logical volume to that mount point
4. Enable automount of the new FSE partition (add entry in the `/etc/fstab` file with appropriate options).

The final step is to make FSE aware of the existing directories and files. Do this by initiating a `treewalk` through FSE file system to detect all directories and files (for example, use the `find` command). This needs to be done to introduce `old` directories and files to FSE and to add file attributes to the FSE database.

Installing FSE on an Existing Windows System

The following procedure summarizes the steps to convert a Windows NT file system (NTFS) to a Windows NTFS FSE file system:

1. Configure a new partition on the server side with *`VolumeID`* of that NTFS volume that is to be put under FSE control. (See "Configuring Mount Points for FSE Partitions and Mounting the Corresponding Volumes" on page 84.)
2. Because NTFS will probably be attached to the volume, dismount it:

   ```
   fse --dismount-ntfs
   ```

3. Mount the drive (partition) to put it under FSE control. For example, to mount drive `D:\`:

   ```
   fse --mount D:\ VolumeID
   ```

Note: Mounting directly to a drive letter works but with some limitations. The better solution is to mount to a subdirectory.

The final step is to make FSE aware of the existing directories and files. Do this by initiating a `treewalk` through FSE file system to detect all directories and files. For example, for directories:

```
DIR /S T:\
```

and all files, for example:

```
ATTRIB +A /S T:\*
```

This needs to be done to introduce *old* directories and files to FSE and to add file attributes to the FSE database.

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